METU BS PROG
GRADUATE SEMINARS

BS 501 Spring Semester 2024-25

BS 501

This is the official document prepared for the graduate seminar course of BS 501.

Spring 2025 Semester

Date of the Meeting: 25.06.2025
at Kubbealtı, Faculty of Architecture

Online Meeting Link:
https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZjE1NGE2NWQtZGU1MC00OTkyLWIzNWYtYjEyNTZlNzM3NDFj%40thread.v2/0?context=%7b%22Tid%22%3a%22b0a2e24d-d188-4a4c-a1e4-82162e060566%22%2c%22Oid%22%3a%22624a362a-6add-4ed7-afc7-fd1576bc26eb%22%7d

Meeting ID: 378 263 222 061
Passcode: Ge9vi9zN

Course Instructor: M. Koray Pekeriçli

09:00 – 09:20 **Bioclimatic Architecture on the Swahili Coastline: A Study on the Physical, Hygric, and Thermal Properties of Coral Stone**
Mohit Purshotam

09:20 – 09:40 **Evaluating the DfD Potential of Light Gauge Steel Structures in the Context of Circularity**
Sueda Aktepe

09:00 – 09:20

Bioclimatic Architecture on the Swahili Coastline: A Study on the Physical, Hygric, and Thermal Properties of Coral Stone

Mohit Purshotam
Supervisor: Soofia Tahira Elias-Ozkan
Jury Members: Deniz Üçer Erduran
Bilge Alp Güney

As construction activities increase in coastal areas, utilising locally available raw materials becomes increasingly important, and therefore, locally sourced coral stone becomes the most feasible material in tropical regions. The exploitation of this material for construction on the Swahili coastline had continued for several decades before contemporary materials such as cement and steel became more prevalent. Coral stone in this part of the world has been used as a vernacular material both as masonry and aggregate incorporated into lime mortars and plasters, which have brought several bioclimatic benefits for humidity transfer and thermal comfort within buildings in the hot and humid tropical climate. Increased rainfall, humidity, and higher temperatures in tropical regions due to climate change have raised concerns about humidity buildup and thermal comfort in buildings. A limited amount of research has focused on these benefits and reviving the use of coral as a building material, as most researchers have focused on utilising coral stone as aggregate in concrete. This research aims to investigate the physical, mechanical, hygric, mineralogical and finally thermal properties to provide an insight into how the revival of coral stone use in contemporary construction may be beneficial for coastal construction, as well as how historical buildings already constructed with this material can be better protected. This paper, therefore, highlights the scope and the methodology to be used for an empirical investigation.

keywords: Coral Stone, Bioclimatic Materials, Breathability, Thermal Performance, Coastal Construction

09:20 – 09:40

Evaluating the DfD Potential of Light Gauge Steel Structures in the Context of Circularity

Sueda Aktepe
Supervisor: Soofia Tahira Elias Özkan
Jury Members: Bekir Özer Ay
Deniz Üçer Erduran

The construction sector contributes to environmental impacts with a significant share. Buildings, including the production of construction materials and maintenance, create a high amount of energy-related carbon emissions. Steel is one of the construction materials which is widely used and energy intensive. However, it has the potential to reduce the environmental impacts by utilizing circular approaches. Therefore, the focus of the study is on light gauge steel construction and production to observe the outcomes of the circularity in steel construction more evidently. Specifically, the deconstruction of steel structures and reuse of steel components as efficient End of Life (EoL) scenarios are observed to measure the benefits of circularity. Additionally, Design for Deconstruction (DfD) as a strong strategy to plan the EoL scenarios is evaluated with a focus on how to manage the disassembly of steel construction for reuse. In this context, a comparative life cycle assessment (LCA) of a light gauge steel (LGS) structure under two EoL strategies is conducted: recycling, as the expected scenario, and reuse, as a potential strategy alternative. By quantifying environmental impacts such as carbon emissions and energy consumption, the study aims to assess the benefits of reuse through planned disassembly strategies. The findings seek to emphasize the role of DfD in promoting circularity in steel construction and to support a shift in conventional practice from recycling toward reuse.

keywords: Building Circularity, Design for Deconstruction (DfD), Steel Reuse, End of Life (EoL)

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GRADUATE SEMINARS

BS 601 Spring Semester 2024-25

BS 601

This is the official document prepared for the graduate seminar course of BS 601.

Spring 2025 Semester

Date of the Meeting: 25.06.2025
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https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZjE1NGE2NWQtZGU1MC00OTkyLWIzNWYtYjEyNTZlNzM3NDFj%40thread.v2/0?context=%7b%22Tid%22%3a%22b0a2e24d-d188-4a4c-a1e4-82162e060566%22%2c%22Oid%22%3a%22624a362a-6add-4ed7-afc7-fd1576bc26eb%22%7d

Meeting ID: 378 263 222 061
Passcode: Ge9vi9zN

Course Instructor: M. Koray Pekeriçli

09:40 – 10:00 **Effect of PCM incorporation on the thermal performance of traditional construction materials**
Benard Aluma

10:00 – 10:20 **Synthesis of Old and New: Reusing Building Elements and Quality Assessment in Circular Buildings**
Atike Yağmur Köseoğlu

10:20 – 10:40 **The Increasing Role of Blockchain-Enabled BIM in Construction Management: Exploring the Potential for Claim and Dispute Resolution**
Eda Nur Erdem

09:40 – 10:00

Effect of PCM incorporation on the thermal performance of traditional construction materials

Benard Aluma
Supervisor: Soofia Tahira Elias Özkan
Jury Members: Ayşem Berrin Çakmaklı
Nastaran Deljavan

The building sector is responsible for approximately 30% of global energy use and contributes to around 35% of energy-related emissions worldwide, primarily due to the significant heating and cooling requirements for interior spaces. This fact underscores the need for improvement in energy efficiency and the enhancement of thermal comfort. Phase Change Materials (PCMs) offer a promising solution for thermal energy storage (TES) by using latent heat absorbed or released during a phase transition at a specific temperature. Incorporating PCMs into natural building materials commonly used in traditional building techniques, such as cob, rammed earth, earthbags, and compacted earth blocks (CEBs), has been investigated to enhance the thermal performance of the building envelope. Studies have demonstrated that integrating PCMs can significantly reduce indoor temperature fluctuations, improve thermal comfort, decrease heating and cooling energy consumption, as well as contribute to peak load saving or shifting. Nevertheless, PCMs have some problems, such as the inherent low thermal conductivity of many PCMs, low fire resistance and potential negative impacts on the mechanical strength of the primary material. This study provides a detailed discussion of PCMs, including their types, drawbacks, potential solutions, as well as their properties and characterization methods. The research further examines the effect of incorporating PCMs into vernacular materials on their thermal and mechanical properties, as reported by various authors.

keywords: PCMs, Thermal performance, Traditional construction materials, Thermal energy storage, Energy efficiency

10:00 – 10:20

Synthesis of Old and New: Reusing Building Elements and Quality Assessment in Circular Buildings

Atike Yağmur Köseoğlu
Supervisor: Arzu Gönenç Sorguç
Jury Members: Ayşem Berrin Çakmaklı
Mehmet Koray Pekeriçli

Circularity and sustainability have created a paradigm shift in the built environment, with the use of the 3R principle: reduce, reuse, and recycle, which later evolved into the 6R, 7R, 9R, and 10R principles known as the R-ladder. While the concept of reuse in the built environment has shown significant potential, a gap remains in the quality assessment of reusing elements at the building scale. Over the years, engineering and material disciplines have implemented reuse techniques using various tests and control mechanisms to confirm the suitability of reused components. However, the built environment lacks developed systems that aim to ensure building components are suitable for modularity, disassembly, and reuse.The shearing layer concept illustrates that a building comprises multiple layers with varying time spans. This raises important questions regarding which building elements are suitable for reuse, how multiple use affects their overall performance, and to what extent a building can synthesize old and new components. This study aims to address these gaps by exploring decision-making mechanisms for reusing building elements that consume a part of their lifespan, evaluating their performance under new structures and pressures, and examining the potential synthesis of new and reused elements in circular building design.

keywords: Circular Buildings, Reuse, Quality Assessment, Decision-Making

10:20 – 10:40

The Increasing Role of Blockchain-Enabled BIM in Construction Management: Exploring the Potential for Claim and Dispute Resolution

Eda Nur Erdem
Supervisor: Ali Murat Tanyer
Jury Members: Arzu Gönenç Sorguç
Mehmet Koray Pekeriçli

Digitalization has become increasingly significant in the construction industry, particularly as it is integrated into project management processes to enhance productivity, quality control, and risk management. As the number of stakeholders involved in projects continues to grow and project scopes become complex, the role of digital communication technologies has gained critical importance. Among digital tools, BCT emerges as a transformative innovation with cross-sectoral applications. Although current literature has largely focused on the application of BCT in areas such as smart contracts and supply chain management, its capacity to contribute to the management of construction errors and to offer a digital framework for claim and dispute resolution has yet to be fully examined. This study explores how BIM-based BCT can enhance key aspects of construction management. These include the controlled tracking of revisions, secure documentation of changes, reduction of coordination problems, and enhancement of information flow. By integrating blockchain's decentralized, unalterable data with BIM's collaborative environment, the study examines how this synthesis enhances transparency, efficiency, and accountability in project delivery. This research seeks to fill the literature gap by examining the implementation of BCT as an integral component of project management, particularly in supporting the digital transformation of claim and dispute management mechanisms.

keywords: Blockchain, BIM, Risk Management, Digitalization in Construction