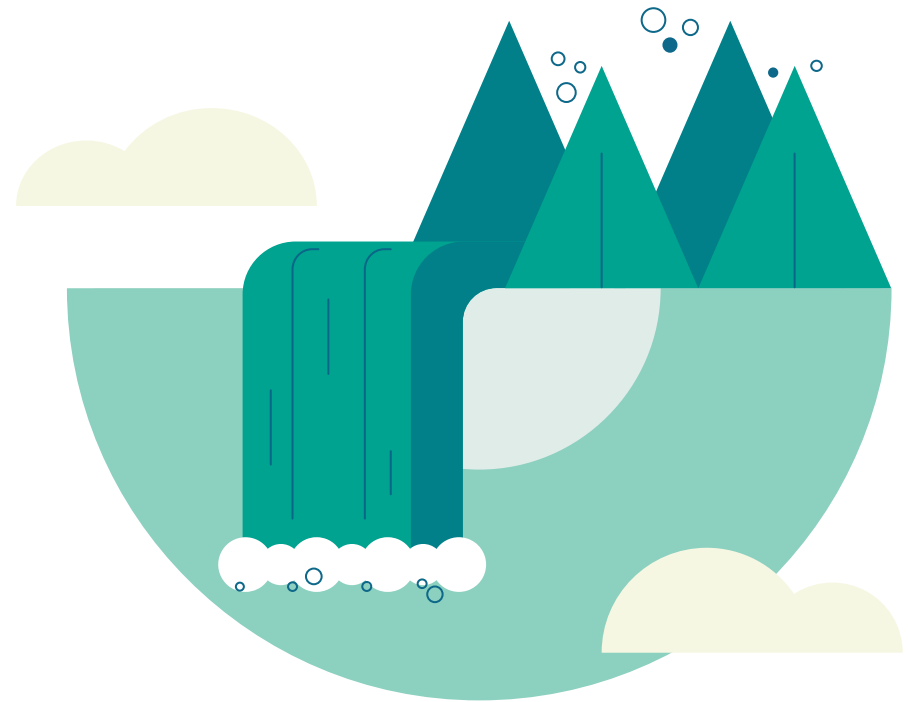


# INTRODUCTION TO SUSTAINABILITY





## Lecture 1

Introduction to  
Sustainability

Department of  
Architecture  
PG-MSc Study

Lecturer:  
Dr. Hardi Barznji

2023-2024

- Course Contents
- Course Objectives
- Course Topics
- Sustainability
- Background of Sustainability
- Definitions of Sustainability
- Development of Sustainability
- Hierarchy of Sustainability Dimensions
- Examples of Sustainability

# 1. Course Details

- Course title: **Architectural Sustainability**
- Program: **PG: MSc study**
- Semester: **Spring, 2023-2024**
- Duration: **3 hours/week**

# Course Contents

- The pace at which **resource consumption** is increasing in every field, it has become imperative **to consider sustainability in all aspects.**
- **Buildings are a major consumer of resources** through their life time. This has been realized by the nations world over and hence stricter norms and laws for construction are being laid.
- Buildings are supposed to be more and more efficient and optimal in consuming resources. Such buildings are called **sustainable buildings** and all buildings will be required to be sustainable.
- Hence this course becomes important in understanding:
  1. The basic parameters of sustainable buildings.
  2. Design, Practices and technology which would lead to creation of such buildings.
  3. Science behind performance of efficient buildings.

# Course Contents

- Due to global warming crisis, it is wise for architects and architectural professionals to design buildings that **respond to sever climatic changes** depending upon advancement in technological issues in architectural design, construction technologies and building materials properties.
- It is important for architects to understand about **the effect of climatic elements on building performance**; then to design their buildings to save energy as well as maintain indoor air and thermal comfort simultaneously.
- *Climatic elements, thermal properties of building material, concepts of thermal energy, reduction through application of different natural phenomena; all these to be applied in building designs to maintain the above needs.*

# Course Contents

- Take benefit of **renewable energies** and working within **sustainable design** through application of most of sustainability or green building rating systems. The common objective is that buildings are designed to reduce the overall impact of the built environment on human health and the natural environment.
- Architects must be aware how to implement all above facts and phenomena in their futuristic designs **to preserve the natural non-renewable energy resources** for other generations and economize all projects with an optimum expenditure of energy consumption and maintaining human comfort climatically at the same time.

# Course Objectives

The objectives of this course are:

- To familiarize students with all climatic elements.
- To understand the relationship between climatic elements and building envelope design.
- To deliver information about renewable energies.
- To understand the technological advancement in building technologies that maintains human comfort climatically within minimal use or net-zero energy or net-positive energy (production of energy more than needed).
- To analyze and apply the various passive solar energy systems on examples of building designs to initiate a variety of advanced concepts with innovative solutions.
- To manipulate building designs to all climatic elements such as thermal transmission, wind benefits from natural ventilation, configuration of openings design due to sun light need functionally, buildings protection from rain water and dampness.

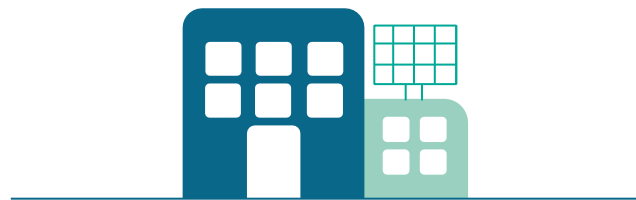
# Topics

- Sustainable Architecture
- Green Building
- Sustainability and Adaptation
- Renewable Energy
- Sustainable Ecology
- Energy-efficient Buildings
- Passive Design Techniques
- Sustainability and Vernacular Architecture
- Environmental Design Strategies
- Climatic Elements
- Measuring Sustainability
- Interactive and Responsive Design
- Building Integrated Photovoltaics (BIPV)





# SUSTAINABILITY



# Background of Sustainability

- Sustainability is a social goal for people to co-exist on Earth over a long time.
- Definitions of this term are disputed and have varied with literature, context, and time.
- Experts often describe sustainability as having three dimensions (or pillars): **environmental, economic, and social**, and many publications emphasize the ***environmental dimension***.
- In everyday use, sustainability often focuses on countering **major environmental problems**, including climate change, loss of biodiversity, loss of ecosystem services, land degradation, and air and water pollution.
- The idea of sustainability can guide decisions at the global, national, and individual levels (e.g. sustainable living).



# Background of Sustainability

- A related concept is **sustainable development**, and the terms are often used to mean the same thing.
- UNESCO distinguishes the two like this:
- "**Sustainability** is often thought of as a long-term goal (i.e. a more sustainable world),
- while **sustainable development** refers to the many processes and pathways to achieve it."

## Sustainability vs Sustainable Development

# Background of Sustainability

Some other key concepts to illustrate the meaning of sustainability include:

- It may be a fuzzy concept but in a positive sense: the goals are more important than the approaches or means applied;
- It connects with other essential concepts such as resilience, adaptive capacity, and vulnerability.
- Choices matter: "it is not possible to sustain everything, everywhere, forever";
- Scale matters in both space and time, and place matters;
- Limits exist.

In everyday usage, sustainability often focuses on the environmental dimension.

# Definitions of Sustainability

- Sustainability is regarded as a "**normative concept**".
- This means it is based on what people value or find desirable: "The quest for sustainability involves connecting what is known through scientific study to applications in pursuit of what people want for the future."
- The 1983 UN Commission on Environment and Development (Brundtland Commission) had a big influence on how we use the term sustainability today.
- The commission's 1987 Brundtland Report provided a definition of **sustainable development**
- The report, Our Common Future, defines it as development that "**meets the needs of the present without compromising the ability of future generations to meet their own needs**".
- The report helped bring sustainability into the mainstream of policy discussions. It also popularized the concept of sustainable development.

# Other Definitions of Sustainability

"Sustainability can be defined as the capacity to maintain or improve the state and availability of desirable materials or conditions over the long term."

"Sustainability is the long-term viability of a community, set of social institutions, or societal practice. In general, sustainability is understood as a form of intergenerational ethics in which the environmental and economic actions taken by present persons do not diminish the opportunities of future persons to enjoy similar levels of wealth, utility, or welfare."

"Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs. In addition to natural resources, we also need social and economic resources. Sustainability is not just environmentalism. Embedded in most definitions of sustainability we also find concerns for social equity and economic development."

Some definitions focus on the environmental dimension. The Oxford Dictionary of English defines sustainability as: "**the property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources**".

# Development of Sustainability Dimensions

- Scholars usually distinguish three different areas of sustainability. These are the environmental, the social, and the economic.
- Several terms are in use for this concept. Authors may speak of three pillars, dimensions, components, aspects, perspectives, factors, or goals. All mean the same thing in this context.
- The three dimensions paradigm has few theoretical foundations. It emerged without a single point of origin. Scholars rarely question the distinction itself. The idea of sustainability with three dimensions is a dominant interpretation in the literature.
- In the Brundtland Report, the **environment** and **development** are inseparable and go together in the search for sustainability. It described sustainable development as a global concept linking environmental and social issues. It added sustainable development is important for both developing countries and industrialized countries:

The 'environment' is where we all live; and 'development' is what we all do in attempting to improve our lot within that abode. The two are inseparable. [...] We came to see that a new development path was required, one that sustained human progress not just in a few pieces for a few years, but for the entire planet into the distant future. Thus 'sustainable development' becomes a goal not just for the 'developing' nations, but for industrial ones as well.

— *Our Common Future* (also known as *the Brundtland Report*),

# Development of Sustainability Dimensions

- The Rio Declaration from 1992 is seen as "**the foundational instrument in the move towards sustainability**".
- It includes specific references to **ecosystem integrity**.
- The plan associated with carrying out the Rio Declaration also discusses sustainability in this way.
- The plan, Agenda 21, talks about economic, social, and environmental dimensions:

Countries could develop systems for monitoring and evaluation of progress towards achieving sustainable development by adopting indicators that measure changes across economic, social and environmental dimensions.

— *United Nations Conference on Environment & Development – Earth Summit (1992)*,



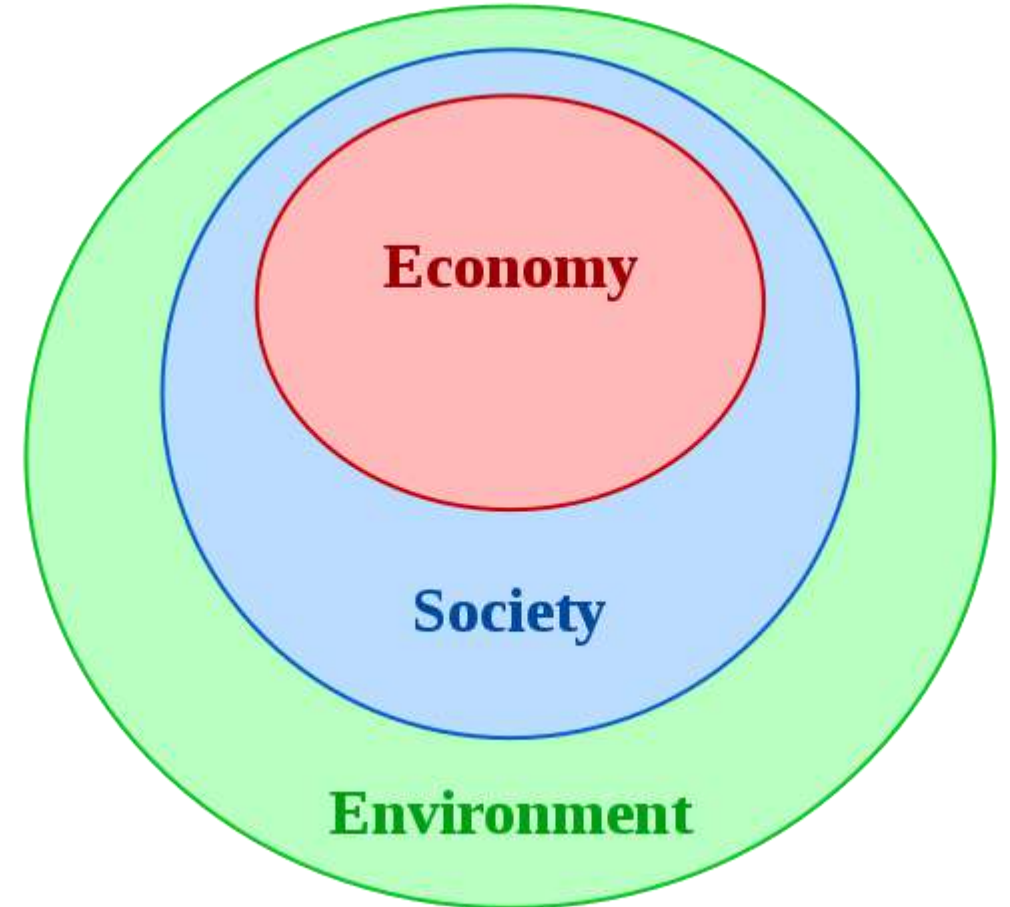
# Development of Sustainability Dimensions

- The 17 Sustainable Development Goals (SDGs)



# Hierarchy of Sustainability Dimensions

- Scholars have discussed how to rank the three dimensions of sustainability. Many publications state that **the environmental dimension is the most important.** (Planetary integrity or ecological integrity are other terms for the environmental dimension.)
- Protecting ecological integrity is the core of sustainability according to many experts. If this is the case then its **environmental dimension sets limits to economic and social development.**
- The diagram with three nested ellipses is one way of showing the three dimensions of sustainability together with a hierarchy: It gives the environmental dimension a special status. In this diagram, the environment includes society, and society includes economic conditions. Thus it stresses a hierarchy.



# Hierarchy of Sustainability Dimensions

- Another model shows the three dimensions in a similar way: In this **SDG wedding cake model**, the economy is a smaller subset of the societal system. And the societal system in turn is a smaller subset of the biosphere system.

