

# Structural Steel and Timber Design SAB3233

## Topic 1 Structural Design – an overview

Prof Dr Shahrin Mohammad



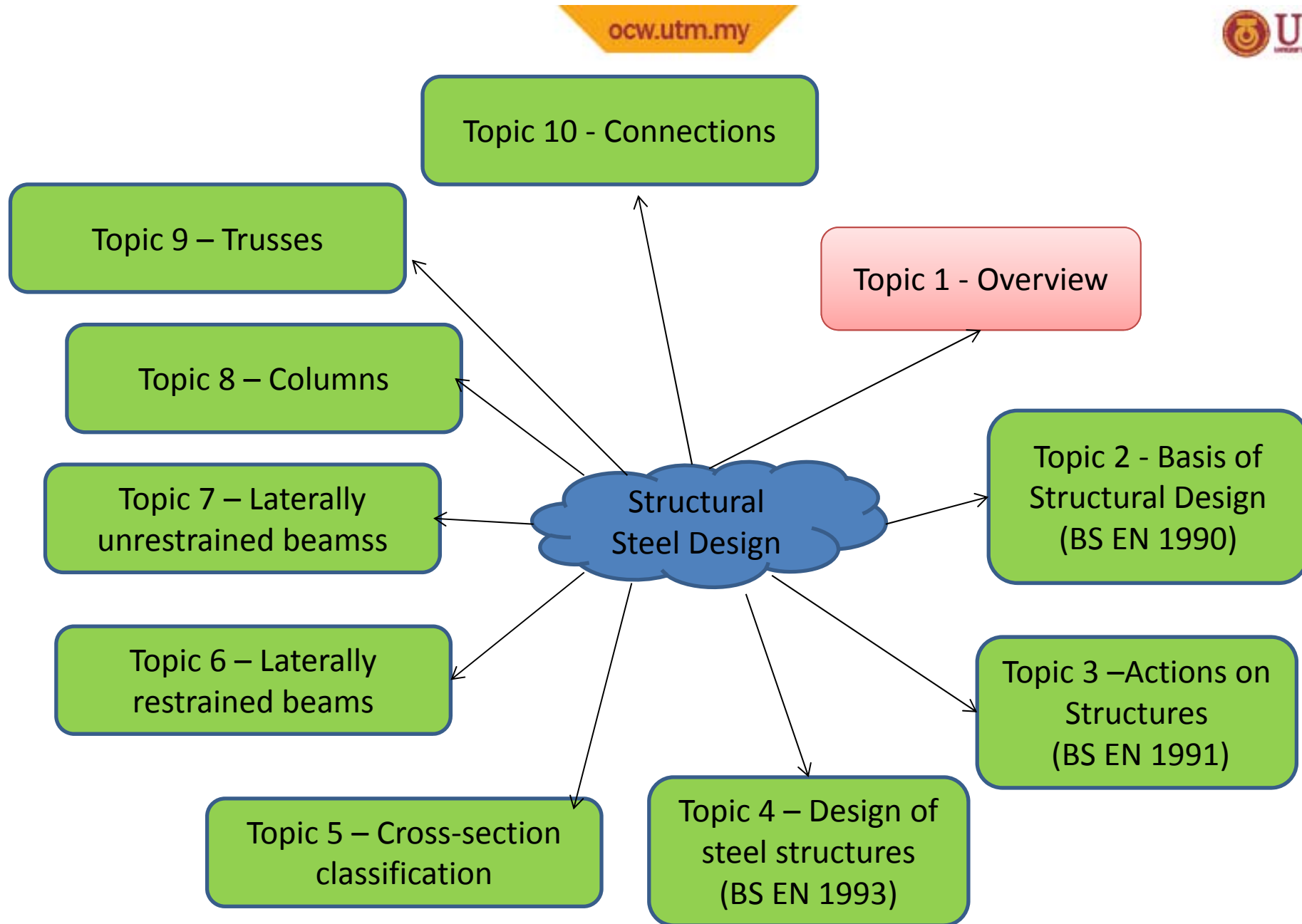


**UTM Director of Strategy Management**  
**President, Society of Engineering Education Malaysia**  
**Associate Director for Engineering Accreditation Dept- BEM**  
**32 years with UTM, 19 years as Academic Administrator (8 post)**

**Senior Director, UTM Quality and Risk Management Centre(2015-16)**  
**Dean Faculty of Civil Eng 2009- 2015**  
**Chairman, Engineering Deans Council, UTM**  
**Academic Quality Director of UTM 2005-2007**  
**Deputy Dean (Academic) 2001-2005, 2008-2009**  
**Quality Mgt Rep ISO 9001:2000 2001-2005**  
**Chairman, Postgraduate Audit Panel – MQA 2013**  
**Group Secretary Academic Performance Audit Panel – MQA 2009**

**Certified ISO 9001:2000 Lead Auditor,**  
**Facilitator/Trainer ISO 9001:2000, Internal Auditor**  
**Engineering Accreditation Council Panel of Trainers**  
**Ministry of Higher Education - facilitator on MQF Credit System**  
**Facilitator/Trainer on Outcome based Approach**  
**Facilitator/Trainer on Quality Assurance for Academic Programme**  
**Facilitator/Trainer on Academic Auditing**  
**Facilitator/Trainer on ISO for TnL and Academic Management**

No.	Course Learning Outcomes	Programme Outcome(s)	Experiences and Soft-Skills	Assessment Methods
1.	<b>Describe</b> the concept and philosophy of steel and timber design based on the relevant code of practice	PO1	C1	T, PR, F
2.	<b>Estimate</b> the design loadings and to analyse structural elements correctly	PO1, PO2, PO3	C3	T, PR, F
3.	<b>Use</b> the code of practise to design structural steel and timber elements.	PO1, PO2, PO3	C5	T, PR, F
4.	<b>Prepare</b> structural design report, drawing plan and structural element detailing before week 15	PO3	P4, A4	PR
5.	<b>Work</b> effectively in a team producing a design report within a stipulated timeframe	PO7	P4, A4, TS1, TS2, TS3,	Peer assessment and ..



**Steel :** metal with 95% or more iron. The remaining constituents are small amounts of elements derived from the raw materials used in the making of the steel, as well as other elements added to improve certain characteristics or properties of the product.

**Structure :** one or more elements arranged in certain form to resist the forces stably and with no excessive deformation.

**Structural steel :** steel in various shapes and forms utilized to support loads and resist the various forces to which a structure is subjected.

Structural design is a process by which an optimum solution is obtained meeting certain established criteria.

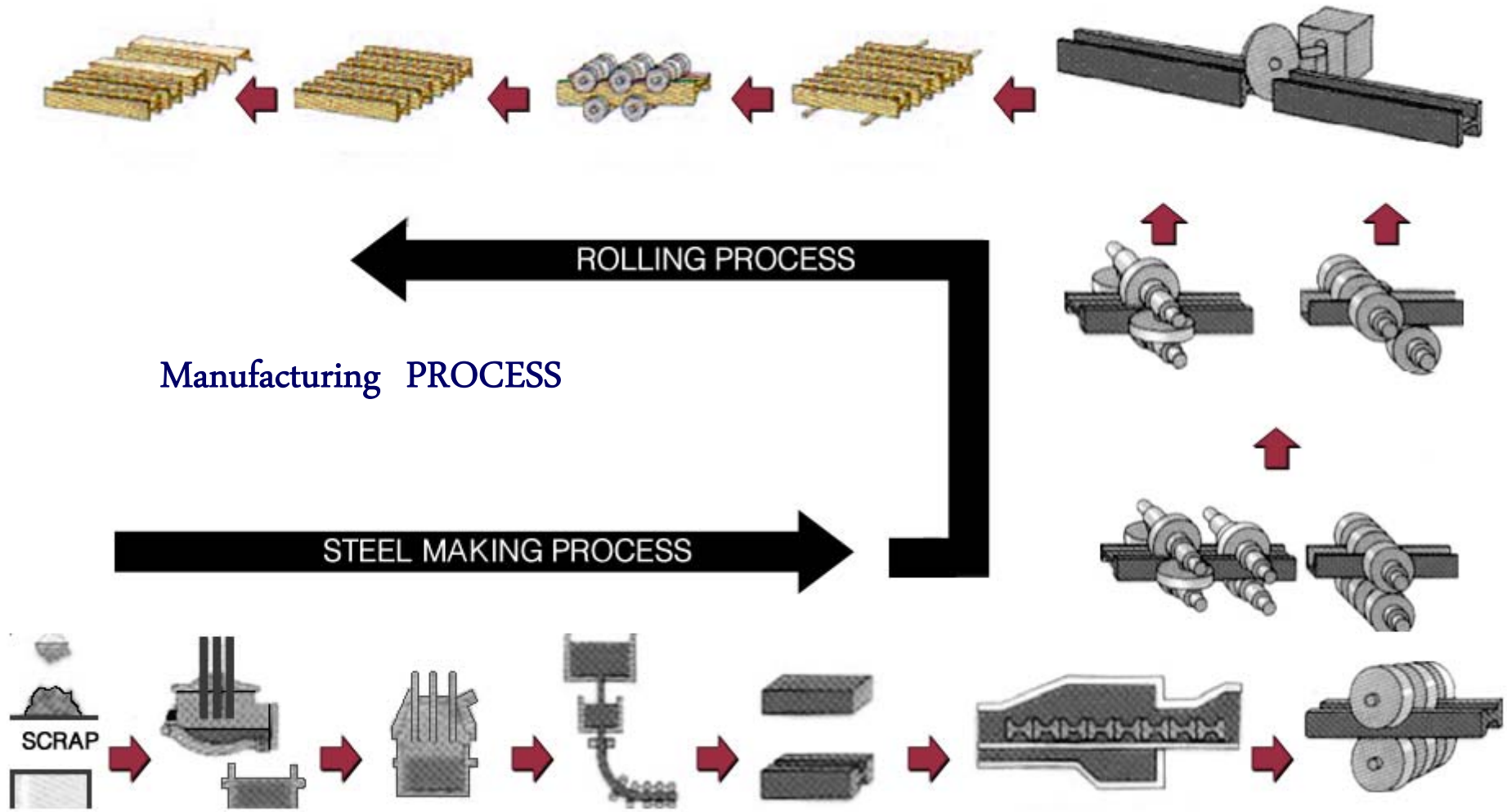
### Aims of Structural Design

- to fulfil its intended function
- to sustain the specified loads for its intended life
- to consider the economical aspect

1. The design should facilitate safe fabrication, transport, handling and erection.
2. It should take account of the needs of future maintenance, final demolition, recycling and reuse of materials

## Why steel?

1. High strength – The high strength of steel per unit of weight means dead loads will be small. This fact is of great importance for long-span bridges, tall buildings, and for structures having poor foundation condition.
2. Uniformity – The properties of steel do not change appreciably with time as do those of a reinforced concrete structure.
3. Elasticity – Steel behave closer to design assumptions than most materials because it follows Hooke's law up to fairly high stress.
4. Ductility – It can withstand extensive deformation without failure under high tensile stresses. It is free from sudden failure. The large deflection occurred when it overloaded gives visible evidence of impending failure ('time for run').
5. Additions to existing structures – New bay or even new wings can be added to existing steel frame building.
6. Time saving – Due to no curing time and scaffolding time, the speed of steel construction far faster than the concrete construction.
7. Flexibility in fabrication - The section geometry, strength, and other properties could be controlled flexibly and accurately.
8. The after-demolished value – Steel is highly reusable, the scrap value is also high even though not reusables in its existing form.





Structural design is a process by which an optimum solution is obtained meeting certain established criteria.

### Aims of Structural Design

- to fulfil its intended function
- to sustain the specified loads for its intended life
- to consider the economical aspect

1. The design should facilitate safe fabrication, transport, handling and erection.
2. It should take account of the needs of future maintenance, final demolition, recycling and reuse of materials