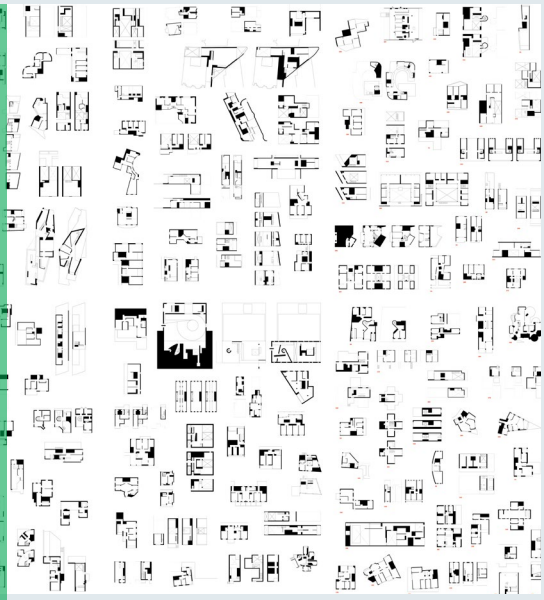
ASD

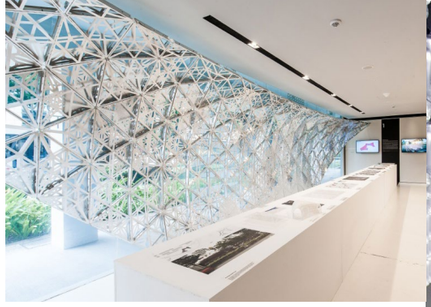
ARCHITECTURE AND SUSTAINABLE DESIGN

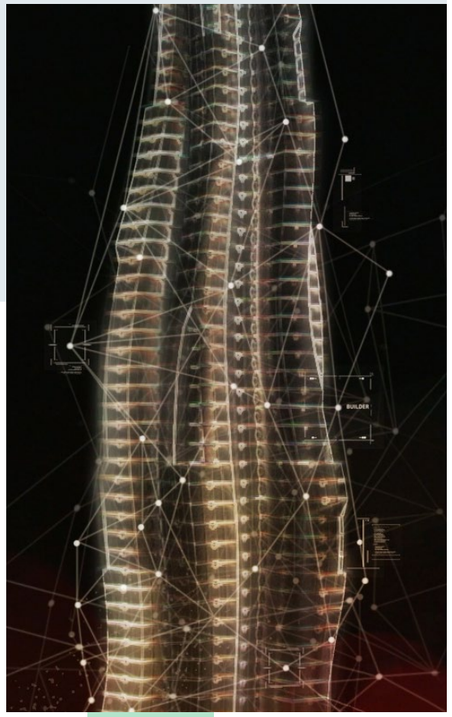


SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Established in collaboration with MIT

PILLAR OVERVIEW





Architecture is currently undergoing fundamental changes as it transitions from the industrial age into the digital era.

- The constraints on resources necessitate a radical rethinking of the traditional skills and trade-based production of the built environment. Advances in digital design and fabrication, such as 3D and 4D printing, numerically controlled milling, nano-materials, composite materials and additive fabrication, combined with digital mass-customisation techniques are simultaneously providing resource-efficient opportunities to the designer, while at the same time lowering production costs.

- Environmental changes are demanding a more ecological approach to the design of architecture and cities: digital data harvested from local sensor networks, satellites, and crowd-sourced information will feed the simulation of environmental forces and conditions (such as wind flows, water flows, sun orientations, topographies, human traffic, etc.), for the sustainable design of future buildings and cities as appropriate ecological responses.

- The urbanisation of the world in the coming decades will add three billion people to urban populations, an amount equal to all city dwellers today. This process of rapid urbanisation, especially in Asia, calls for sustainable architectural and urban solutions at an unprecedented speed and scale, demanding the use of digital tools in architectural and urban design.

The Architecture and Sustainable Design (ASD) pillar focuses on this changing reality, and prepares you for the immediate present and future needs of architecture in a digital era, through an innovative curriculum, conceived in collaboration with MIT. Our particular geographic position in Asia and intimate collaboration with the other SUTD pillars provide ASD with a unique platform for addressing some of the most pressing design problems in architecture and urbanism today. We offer a competitive edge in tackling emerging design challenges such as those related to the rapid urbanisation in Asia, the digitalisation of design practice, or the transformation of fabrication by algorithms and robots.

The ASD pedagogy is characterised by a hands-on approach to architecture and sustainable design, a holistic understanding of the ways in which technology is changing our design and building processes, and an inclusive approach to the cultural and historical aspects of designing buildings and cities. At ASD, we believe that only direct explorations with digital tools, machines and robots will provide the necessary experience for learning and innovating in a digitally fabricated world.

In Singapore and Asia, the number of building construction and real estate development projects has exploded in the recent decade. Still, only very few projects of true intensity and visionary power have seen the light that leverage the technologies of today for the design of a sustainable future. The ASD pillar is educating the next generation of architects to go beyond the busy pre-occupation with ever faster deadlines, instilling the desire for unique voices of true foresight to emerge and stand up. SUTD seeks to develop architectural leaders for a better tomorrow.

The following chart illustrates the ASD curriculum structure. It depicts the typical sequence of subjects. Each major row indicates a calendar year with columns representing the Jan-Apr, May-Aug, and Sep-Dec terms ordered from left to right.

Advanced Math I		Advanced Math II
Physics I		Physics II
Chemistry and Biology: Natural World		Introduction to Design
Humanities, Arts and Social Sciences (HASS)	1	Humanities, Arts and Social Sciences (HASS) 2
Modelling the Systems World		Architecture Core Studio 1
Engineering in the Physical World	Internship/Exchange/Vacation	Architecture Science & Technology
The Digital World		Introduction to Design Computation
Introduction to Biology* Introduction to Physical Chemistry* 3		History, Theory & Culture 1 4
Architecture Core Studio 2		Architecture Core Studio 3
Architecture Structure & Enclosure Design	Internship/Exchange/Vacation	Architectural Energy Systems
Digital Design & Fabrication		Building Information Modelling
History, Theory & Culture 2 5		History, Theory & Culture 3 6
Sustainable Design Option Studio 1	Sustainable Design Option Studio 2	**Graduation** Bachelor of Science (Architecture and Sustainable Design) **Structured Internship**
Capstone	Capstone	
Elective	Elective	
Elective 7	Elective 8	
Sustainable Design Option Studio 3		**Graduation** Master of Architecture
Thesis Preparation		
Elective		
Elective 9	Thesis Project 10	

– Freshmore Subject – Core Subject – Elective Subject – Capstone/Option Studio

*half-credit subject

CORE SUBJECTS

The ASD pillar core encompasses Terms 4, 5 and 6. The Design Studio sequence is at the heart of the programme and is unique to architectural education. Subjects revolve around the Design Studio sequence and fall into four areas of focus: Studio; Design Computation; Building Technology; and History, Theory and Culture.

The ASD core is structured to develop your ability to think critically; to design through enquiry, reflection and invention; to directly experience construction; to understand the technical demands of building; to think digitally and physically through drawing, making, and writing and speaking – and to be socially, sustainably and ethically responsible.

In addition to the traditional course framework, you will be exposed to the economics of architecture - real estate valuations, finance, environmental studies (Term 6) - as well as to architectural history, theory and culture.

The ASD core subjects are led by both professionals and academics actively engaged in contemporary architectural practice and research. Teaching will comprise an industry-oriented approach that is thoroughly rooted in the economic, technical, and social frameworks of contemporary society. Active learning with strong emphasis on design doing permeates every class offered. In addition to studio and class work, ASD organises Distinguished Lecture Series featuring prominent academics and leading practitioners.

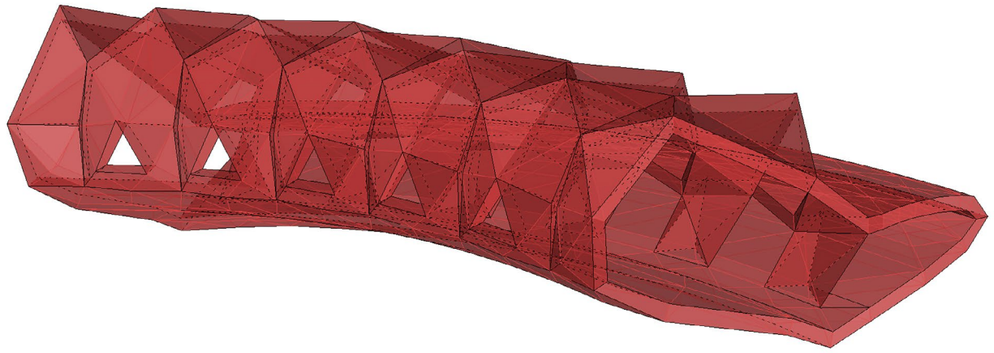
MASTER OF ARCHITECTURE

Students completing eight terms will graduate with a Bachelor of Science (Architecture and Sustainable Design). The Master of Architecture, our professional degree, consists of a structured internship and two additional terms comprising an advanced design and research studio, thesis preparation, two electives, and the actual thesis work.

The ASD pillar is accredited for the Master of Architecture as a professional degree programme by the Singapore Board of Architects. The intent is to equip ASD pillar graduates with the best foundation for practicing architecture nationally and internationally, providing a high level of technical competency and scientific knowledge while being attuned to the business opportunities and cultural contexts that will make their design projects meaningful and sustainable.

ASD graduates will be prepared for positions in:

- Architecture
- Urban Design
- City Planning
- Environmental Design
- Construction Management
- Real-estate Development
- Post-professional Masters
- PhD Programmes



CAPSTONE AND STUDIO OPTION

In the fourth year (Terms 7 and 8), you will be able to choose from a number of option studios, capstone studios and electives. The option studio and the capstone studio represent culminating projects for the Bachelor of Science in Architecture and Sustainable Design programme, offering you the opportunity to work on real world problems individually and in interdisciplinary and cross-pillar teams.

INTERNSHIP

Throughout the ASD curriculum, you will have the opportunity to intern in architecture, urban design and real estate firms and apply your knowledge in real situations. SUTD provides you with the connection to a vast network of local and international architectural firms. There is also an Architecture Practice in Residence programme at SUTD.

ELECTIVES

Several electives will be offered to address emerging challenges such as critical resource constraints, the need for energy-efficient and liveable housing, rapid urbanisation, transportation planning, historical conservation and land use transformations. The electives will draw from ASD's distinct geographical situation in Asia, the collaboration with MIT, the partnership with Zhejiang University, and the particular intellectual position among the engineering pillars and the humanities, arts and social sciences at SUTD which give ASD a unique edge for anticipating and contributing to the fundamental shifts happening in contemporary architecture and urbanism.

ECOLOGICAL URBAN ARCHITECTURE

Focusing on both qualitative and quantitative aspects of ecological design, we in ASD believe that the exploration of areas in which architects can use their creative skills and methods to achieve sustainable results on the urban scale is key for addressing some of the most pressing challenges of our time. These include research on strategies of materialisation in architecture, the extensive use of environmental simulations, as well as new methods of transformation of existing urban environments.

BIG DATA AND SMART NATIONS

Larger ever data sets – from hidden street cameras, satellites, to the collection of mobile users' information – are becoming instantly available, enriching but also overloading the everyday citizen. At ASD, we believe that the capacity and sensibility to leverage big and small data transparently through algorithms, programmes and scripts will critically complement the traditional skills of an architect for the design of future smart cities and smart nations.

INTEGRATED BUILDING SYSTEMS

Emerging architectural and urban problems are becoming increasingly complex, challenging the traditional disciplinary boundaries of architecture, and inevitably requiring the joining of multi-disciplinary forces. At ASD, we believe that the role of the architect must be: to not only collaborate with other disciplines, but also, and foremost, to provide the vision and leadership for multi-disciplinary initiatives towards a sustainable built future.

ADVANCED DESIGN COMPUTATION

The computer is expanding the traditional formal horizon of the architect towards complex geometries. Empowered by recent advancements in digital tools, such as parametric modelling, Nurbs, morphogenetic simulations, the contemporary design scene is increasingly shaped by an architectural avant-garde who is embracing non-standard forms and non-Euclidean geometries exuberantly as central elements for architectural expression. At ASD, we believe that a fine mastery of emerging digital tools and a healthy scepticism towards the meaning of their use will be indispensable for developing a critical practice in the digital age.

EAST AND WEST

The concentration of worldwide architectural production has shifted from the west to the east: Asia is the new centre of gravity for global construction. The rapid urbanisation in Asia calls for sustainable architectural and urban solutions at an unprecedented pace and urgency, at a global scale, demanding the combined arts and technologies, knowledge and philosophies from both the west and the east: Feng Shui meets GIS.

ADVANCED DIGITAL FABRICATION

Machines and robots are challenging the traditional skills and trade based production of architecture. Advancements in digital fabrication are simultaneously providing new formal freedom to the designer, while at the same time lowering fabrication costs. In the advanced digital fabrication electives, you will experience and be versed in the theory and practice of digital fabrication and robotic architecture.

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