

Two Day Short Course on Blast Loading on Structures: Design, Response and Mitigation Strategies

Course designed for professional engineers and consultants, researchers and graduate students, government officers who may involve in analysis, testing, modelling, design and the assessment of structures against blast and impact loads. It will cover basic and theoretical concepts, material characterisation, analytical, modelling and design methods and practical applications for structural protection against blast and impact effects.

Date: 13-14 February 2025, Thursday-Friday

Time: 9:00am to 5:30pm

13-Feb	Thursday	14-Feb	Friday
09:00-09:55	Introduction to Blast Loading on Structures and Protection Concepts	09:00-09:55	Response of Structures to Blast Loading part I
09:55-10:15	Tea Break	09:55-10:15	Tea Break
10:15-11:10	Equivalent SDOF for Structural Members	10:15-11:10	Response of Structures to Blast Loading part II
11:10-11:20	Break	11:10-11:20	Break
11:20-12:15	P-I Diagram for Structures	11:20-12:15	Design of Reinforced Concrete Structures to Blast Loading part I
12:15-13:15	Lunch	12:15-13:15	Lunch
13:15-14:10	Blast Load Idealization and Computation Part I	13:15-14:10	Design of Reinforced Concrete Structures to Blast Loading part II
14:10-14:20	Break	14:10-14:20	Break
14:20-15:15	Blast Load Idealization and Computation Part II	14:20-15:15	Progressive Collapse of Structures Part I
15:15-15:35	Tea Break	15:15-15:35	Tea Break
15:35-16:30	Blast Load Measurement	15:35-16:30	Progressive Collapse of Structures Part II
16:30-16:40	Break	16:30-17:00	Panel Discussion
16:40-17:30	Blast Load Simulation		End of course

Venue: NTU-CEE Seminar Room A (N1-B1b-06), Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798

Abstract:

Impact, blast, and shock threats pose significant challenges across engineering, security, and defense sectors, often linked to industrial safety and critical infrastructure protection. This two-day course provides a comprehensive overview of principles, analysis, and design strategies for mitigating these effects. Key topics include blast load simulation, structural response, material characterization, and protective design methodologies. Led by renowned scientists, the course combines engaging lectures, practical case studies, and interactive discussions to equip professionals with the knowledge and skills to address challenges in blast-resistant design. The program concludes with actionable insights and a holistic understanding of modern approaches to structural protection.

Registration Fee (with tea breaks & buffet lunch, fees inclusive of prevailing GST):

S\$900/pax

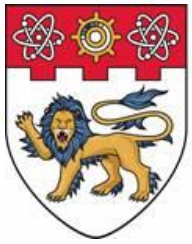
S\$ 800/pax (NTU Alumni)

Registration link: <https://forms.office.com/r/isybzjd38s>

PDU units pending PE Board approval

Cancellation: The organisers reserve the right to amend any details relating to the seminar, revise the seminar fees without prior notice, cancel or postpone the seminar.





Two Day Short Course on Blast Loading on Structures: Design, Response and Mitigation Strategies

Speaker 1: Prof. Tan Kang Hai

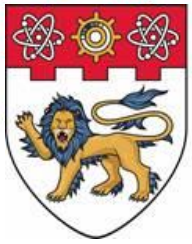


Prof. Tan Kang Hai is currently a professor at Nanyang Technological University and the director of Protective Technology Research Centre. Prof. Tan has published over 300 internationally renowned SCI journal papers with over 14000 citations. He has been ranked among the top 2% of global scientists at Stanford University for many consecutive years. Prof. Tan has high international reputation in the field of progressive collapse and fire resistance of structures, and won the Best Paper Award from SCI journal Structures in 2023 and the High Citation Research Award from the journal Engineering Structures. He serves on the editorial board of Cement and Concrete Composites, a premier journal in the field of cementitious materials and concrete technology. At the same time, he is also a registered professional engineer and expert-level engineer in the field of protection in Singapore. He has been awarded the Public Administration Medal (Bronze) and MND Medallion for service and contributions to the HDB Civil & Structural Engineering Advisory Panel. He is a member of the 17th Singapore Building Structure and Substructure Standards Committee and serves as the Chairman of Appeals Advisory Board for Infrastructure Protection Act. He has supervised over 50 PhD students to date, several of whom have received the Best PhD Thesis Award and other academic honors.

Speaker 2: Prof. Yu Jun



Prof. Yu Jun is currently working as a professor in School of Civil Engineering, Southeast University (SEU), Nanjing, China. He has been ranked among the top 2% of global scientists at Stanford University for many consecutive years. Prof. Yu has high international reputation in the field of progressive collapse of structures, and won the Best Paper Awards from the SCI journal Structures in 2023 and from the International Conference on Design & Analysis of Protective Structures (DAPS) in 2012. He has awarded “Distinguished Young Scholar Fund of Jiangsu Province” in 2018, and 3 grants from National Science Foundation of China. He served as a committee member in China to draft “Standard for anti-collapse design of building structures (T/CECS 392-2021)”, successfully organized 2024 China and Singapore International Conference on Applied Mechanics and Engineering (CSAME) and other two domestic academic conferences regarding disaster mitigation for civil structures. He is also a member of American Society of Civil Engineering (ASCE) and International Association of Protective Structures (IAPS).



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Blast Loading on Structures: Design, Response and Mitigation Strategies

Day 1: Thursday, 13 February 2025

Time	Theme	Content	Speaker
09:00-09:55	Introduction to Blast Loading on Structures and Protection Concepts	<ul style="list-style-type: none">❖ Overview: the state-of-the-arts in protective technology❖ Protective plan & design for buildings/infrastructures❖ Mitigation of progressive collapse of a building	Prof. Tan Kang Hai
09:55-10:15 Tea Break			
10:15-11:10	Equivalent SDOF for Structural Members	<ul style="list-style-type: none">❖ Equation of motion under blast load❖ Resistance function of structural members❖ Conversion of structural member to SDOF under blast load	
11:10-11:20 Break			
11:20-12:15	P-I Diagram for Structures	<ul style="list-style-type: none">❖ Concept of pressure-impulse diagram❖ Examples of P-I diagram for structure members under uniformly distributed blast load	
12:15-13:15 Lunch			
13:15-14:10	Blast Load Idealization and Computation Part I	<ul style="list-style-type: none">❖ Blast pressure determination❖ Calculation of blast loads on building surface	Prof. Yu Jun
14:10-14:20 Break			
14:20-15:15	Blast Load Idealization and Computation Part II	<ul style="list-style-type: none">❖ Case studies❖ Blast parameter calculation examples❖ Blast wave loads for element design	
15:15-15:35 Tea Break			
15:35-16:30	Blast Load Measurement	<ul style="list-style-type: none">❖ Measurement of incident and reflected blast load❖ Typical test set-up	
16:30-16:40 Break			
16:40-17:30	Blast Load Simulation	<ul style="list-style-type: none">❖ Simulation method using ALE❖ Charge shape effect	

End of first day



Two Day Short Course on Blast Loading on Structures: Design, Response and Mitigation Strategies

Day 2: Friday, 14 February 2025

Time	Theme	Content	Speaker
09:00-09:55	Response of Structures to Blast Loading Part I	<ul style="list-style-type: none"> ❖ Typical experiment of structure members under near-field blast load ❖ Structural response under near-field blast load 	Prof. Yu Jun
09:55-10:15 Tea Break			
10:15-11:10	Response of Structures to Blast Loading Part II	<ul style="list-style-type: none"> ❖ Typical failure mode under contact detonation ❖ Computation of damage size under contact detonation ❖ Case studies 	
11:10-11:20 Break			
11:20-12:15	Design of Reinforced Concrete Structures to Blast Loading Part I	<ul style="list-style-type: none"> ❖ Strain rate effect of concrete and steel materials ❖ Flexural design of concrete members against blast load ❖ Reinforcement detailing for flexure design 	Prof. Tan Kang Hai
12:15-13:15 Lunch			
13:15-14:10	Design of Reinforced Concrete Structures to Blast Loading Part II	<ul style="list-style-type: none"> ❖ Shear design of concrete members against blast load ❖ Reinforcement detailing for shear design 	
14:10-14:20 Break			
14:20-15:15	Progressive Collapse of Structures Part I	<ul style="list-style-type: none"> ❖ Definition & histories ❖ Issues in current standards & practices ❖ Overview of UFC 4-023-03, July 2009 ❖ Examples of progressive collapse analysis 	Prof. Yu Jun
15:15-15:35 Tea Break			
15:35-16:30	Progressive Collapse of Structures Part II	<ul style="list-style-type: none"> ❖ Criteria used in progressive collapse analysis ❖ Experiments on progressive collapse 	
16:30-17:00	Panel Discussion	<ul style="list-style-type: none"> ❖ Q&A 	

End of course