

Dynamic Loading and Response of Structures Workshop 2ECSA CPD

First Event: 28th – 29th May 2026

Second Event: 30th – 31st July 2026

Venue: Protea by Marriott Hotel Johannesburg Wanderers

Workshop Overview

How does dynamic loading affect the stress analysis of your structures?

This two-day workshop is aimed at transferring knowledge and skills to civil and structural engineers on the fundamentals and practical applications of structural dynamics analysis techniques in support of the design of structures to withstand rare dynamic actions including that of an earthquake. Focus of this two-day training workshop will be to cover topics such as single degree of freedom systems, forced vibration, multi-degree of freedom systems and the design of reciprocating foundations, taking into consideration standards and codes applicable.

- Gaining Insight into the issues associated with load assessment
- Design concentrating on wind and wave loading effects on structures
- Gaining insight into seismic design codes
- Vibrations and impacts on engineering structures
- Analytical Dynamics
- Regulations and standards
- Single and Multi-Degree of Freedom Systems
- Response analysis and factors that must be addressed in developing a successful

To stay updated follow, us on LinkedIn 



+27(0)10 023 3396



info@alliancetc.co.za



www.alliancetc.co.za



Our experienced facilitator

Prof. Jeffrey Mahachi

Dr. Jeffrey Mahachi is a registered professional engineer and a registered construction project manager. Jeffrey holds a PhD in structural engineering from the University of the Witwatersrand, a Masters degree in structural engineering from Surrey University (UK), a Masters degree in Information Technology from the University of Pretoria, and a BSc Civil Engineering (Hons) degree from the University of Zimbabwe. Jeffrey has worked as a project manager and research engineer at CSIR Building Technology, lectured at the University of the Witwatersrand and has done consulting work in civil and structural engineering. He has written two books on structural engineering and presented several papers at international and local conferences and seminars.

Delegate Note:

Many engineers have plenty of exposure to dynamics as a topic of some importance through the computer software they have purchased and use, presentations they attend in technical seminars and conversations they have with specialists. The subject matter of dynamic loading and response of structures is seldom well understood. Few engineers have the time to go through textbooks in a systematic manner, and this is especially the case for the more senior members of the profession who have been out of university for a long time. This two-day workshop is aimed at giving a technical discussion in dynamic analysis and design. The objective is to review fundamental concepts, analysis techniques and rules-of-thumb to eliminate structural problems.

It will equip the engineer with knowledge of structural dynamics for problems most frequently encountered in the structural engineering field. The focus of this two-day training workshop will be to cover topics such as single degree of freedom systems, forced vibration, multi-degree of freedom systems and the design of reciprocating foundations, taking into consideration standards and codes applicable. Experienced professional engineers who are in a supervisory position, and are responsible for the design, or construction of a structure, normally experience difficulties when it comes to reviewing results of structural dynamic analyses obtained by (usually) more junior members of the design team as it is often unclear what results they are to expect.

Who Should Attend?

- ❖ Civil Engineers who are engaged in the design or assessment of structures.
- ❖ Structural Engineers who are engaged in the design or assessment of structures.
- ❖ Engineering professionals working in government departments
- ❖ Engineering professionals working in local councils
- ❖ Developers and owners of infrastructure
- ❖ Graduate students involved in the study of, or research into, the performance and design of structural systems subjected to dynamic loading would also benefit from this workshop.



+27(0)10 023 3396



info@alliancetc.co.za



www.alliancetc.co.za

Core Organizational Benefits:

- ❖ **Failure Prevention:** Training helps engineers identify vulnerable areas prone to failure during earthquakes, windstorms, or other sudden loads.
- ❖ **Accurate Modeling:** Organizations can better manage complex dynamic conditions like vibrations from machinery (pumps, rotating equipment) and human-induced floor vibrations, preventing long-term fatigue or resonance issues.
- ❖ **Reduced Overdesign:** Understanding dynamic behavior allows engineers to avoid conservative "overdesign," leading to efficient material use without compromising safety.
- ❖ **Early Issue Detection:** Identifying potential dynamic problems during the design phase—rather than after construction—prevents costly redesigns and delays.
- ❖ **Employee Value:** Investing in high-level technical training improves job satisfaction and retention, particularly among younger engineers who value skill development and career progression.
- ❖ **Knowledge Transfer:** Workshops often target senior engineers who may have been out of university for some time, bridging the gap between their experience and modern computational techniques.

Core Individual Benefits:

- ❖ **Career Advancement:** Mastering complex analysis techniques like seismic and wind loading positions you as a "future-ready" professional, increasing your value to employers and clients.
- ❖ **Design Confidence:** You develop the ability to confidently "defend and revise" structural decisions when presented to peers or approval authorities.
- ❖ **Advanced Modeling Mastery:** Learn to model Single Degree of Freedom (SDOF) and Multi-Degree of Freedom (MDOF) systems using time-varying characteristics rather than simplified static equilibrium.
- ❖ **Risk Mitigation Skills:** Gain the ability to identify "weak points" in designs prone to failure during extreme events like earthquakes, windstorms, or blasts.
- ❖ **Design Optimization:** Learn to optimize structural shapes and material quantities to minimize vibrations and aerodynamic drag without overdesigning, which saves both time and costs.

Course Outline:

An overview of structural Dynamics

- ❖ Design considerations for dynamic loads
- ❖ Converting dynamic loads to equivalent static loads.
- ❖ A brief overview on the practical application of dynamic loads and how they can be simplified.
- ❖ Identifying different types of dynamic loads on different types of structures.
- ❖ Gaining insight into structural dynamics.
- ❖ Elaborating on human response during dynamics.



Single and Multi-Degree of Freedom Systems

- ❖ Multi-degree of freedom systems.
- ❖ Single degree of freedom systems with excitation forces
- ❖ The determination of equivalent stiffness systems.
- ❖ The equation of motion.
- ❖ Natural frequencies of structural systems

Wind Loads on Structures

- ❖ Discussing different methods for approximating wind periods
- ❖ Gaining insight into gust factors
- ❖ Considering dynamic effects
- ❖ Gaining insight into dynamically sensitive buildings
- ❖ Discussing dynamic response of slender structures under wind loads
- ❖ Examining design considerations for wind loads
- ❖ Performing dynamic analysis simulated wind histories
- ❖ Testing for dynamic response due to wind loads
- ❖ A holistic approach to dynamic analysis for winds
- ❖ Incorporating damping when analyzing wind loads

Seismic Loads On Structures:

- ❖ Determining seismic period
- ❖ Gaining insight into seismic design codes
- ❖ Design considerations for seismic loads incorporating
 - Linear dynamic analysis
 - Non-linear static analysis
 - Non-linear dynamic analysis
- ❖ Technical geometry of structural stability for dynamic loads
- ❖ Examining the earthquake response spectrum on structures
- ❖ Understanding load take-down and its relevance
- ❖ Overseeing load reductions in structures
- ❖ Elaborating on structural resonance

Regulations and Standards

- ❖ Discussing applicable regulations and standards for structural dynamics
- ❖ SANS codes
- ❖ Gaining insight into other seismic codes
- ❖ Implementing recent amendments to the wind loading codes

Damping Properties of Vibrating Structures

- ❖ Evaluating the effects of damping on structures
- ❖ Understanding damping properties
- ❖ Identifying damping types through collected data
- ❖ Locating damping elements from structures



- ❖ Estimating the damping matrix
- ❖ Gaining insight into numerical assessment of damping property investigation

Analytical Dynamics

- ❖ Gaining insight into different forms of Finite Element Analysis models
- ❖ Evaluating structural connectivity in an analytical model
- ❖ Locating mis-modelled regions in an analytical model
- ❖ Improving analytical models
- ❖ Discussing compatibility of measured models and analytical models
- ❖ Applying modeling error location to a real structure

Vibrations and Impacts on Engineering Structures:

- ❖ Vibration limitations
- ❖ Understanding limits to vibrations (how much is acceptable)
- ❖ Dynamic magnification factors
- ❖ Resonance
- ❖ Frequency ratios and design limitations
- ❖ Out-of-balance forces of machines
- ❖ Eigen values and Eigenvectors
- ❖ Design examples

Foundation Design for Vibrating Machinery

- ❖ Interpreting equipment vibrations
- ❖ Empirical design rules
- ❖ Dynamic E
- ❖ Sub grade reactions
- ❖ Natural frequency calculations
- ❖ Amplitudes of vibration
- ❖ Limitations on amplitudes
- ❖ Design examples

Please Note:

- ❖ A copy of South African ID/ Passport is required for CPD certification.
- ❖ Bringing along your laptop/notebook computer is encouraged but not essential.
- ❖ You gain skills in high demand for specialized roles such as Structural Analyst or Consulting Engineer
- ❖ Stay current with recent amendments to international codes, such as wind loading and seismic design standards.
- ❖ Our workshops often use case studies involving modern challenges like pedestrian-induced vibrations on bridges or foundation design for reciprocating machinery.





Registration Form

Please write in BLOCK CAPITALS

Alliance Training
& Conferencing
We Power People

Company & Delegates Details

Att: Lethu

info@alliancetc.co.za

Company name: _____

Business Address: _____

Vat: _____

City: _____ Postal Code: _____

 _____ Fax: _____

Delegate Details:

1. First Names _____

Position: _____

Email: _____

2. First Names: _____

Position: _____

Email: _____

3. First Names: _____

Position: _____

Email: _____

4. First Names: _____

Position: _____

Email: _____

5. First Names: _____

Position: _____

Email: _____

Halaal Meal daily price @949.99

Book 5 and get 6th Seat for free

Account Holder	Alliance Training and Conferencing Pty Ltd
Branch name	KRUGERSDORP, TVL 124
Name of Bank	First National Bank
Branch Code	210-835
Account number	62859878997
Swift Code	FIRNZAJJ

First Event : 28th – 29th May 2026

Virtual

In-person

Protea by Marriott Hotel Johannesburg Wanderers

Second Event : 30th – 31st July 2026

Virtual

In-person

Protea by Marriott Hotel Johannesburg Wanderers

Third Event : 27th – 28th August 2026

Virtual

In-person

Protea Hotel Fire and Ice! Pretoria, Menlyn

Price per Delegate: R10 499.99

Virtual Price: R8 999.99



Available

Pay fast available for all international delegates, but pricing excl bank charges

Authorization

Signatory must be authorized to sign on behalf of the contracting Organization:

First Name: _____

Position: _____

Email Address: _____

Signature: _____

Date: _____

THIS BOOKING FORM IS INVALID WITHOUT A SIGNATURE

Terms and Conditions

- Full payment to be made on recipient of invoice in 5 working days.
- Alliance Training & Conferencing reserves the right to refuse entry into the event should full payment not have been received prior to this date.
- Cancellations, No shows & Substitutions: Cancellations received in writing more than 21 days prior to the event being held carry a 50% cancellation fee. Should cancellations be received between 21 days and the date of the event, the full event fee is payable and non-refundable. (Non-payment or non-attendance does not constitute cancellation.)
- Alterations to advertised package: Alliance Training & Conferencing reserves the right to alter this program without notice or penalty and in such situations no refunds or part-refunds or refunds or alternative offer will be made.
- Should Alliance Training & Conferencing permanently cancel an event, for any reason whatsoever, the client shall be provided a credit of the equivalent amount paid towards the cancelled event. In the case of a postponed or cancelled event, Alliance Training & Conferencing will not be responsible for covering airfare, accommodation, or other travel cost incurred by clients.
- Copyright: All intellectual property rights in the materials distributed by Alliance Training & Conferencing in connection with this event are expressly reserved and any unauthorized duplication, publication or distribution is prohibited.
- Please confirm with your company whether conferencing or workshop fees are paid in full before coming to the event to avoid inconvenience.
- We reserve the right to cancel delegate registration if delegate conduct is not followed.
- Warranty of Authority: The signatory warrants that he/she has the authority to sign this application form and agrees to be personally liable to Alliance Training and Conferencing (Pty) Ltd for payment falling due to pursuant thereto should such warranty be breached.
- This signed registration form becomes a legal contract with Alliance Training and Conferencing (Pty) Ltd.