INTRODUCTION

An engineer applying for registration as a Professional Engineer, besides having to hold an approved degree or qualification listed in the Professional Engineers (Approved Qualifications) Notification or other proper and recognized academic qualifications in engineering and satisfies such conditions as the Professional Engineers Board, Singapore may determine and acquiring not less than 4 years’ of relevant practical experience, is also required to sit and pass the Fundamentals of Engineering Examination and the Practice of Professional Engineering Examination.

This preparatory course will cover all the topics stipulated for the Fundamentals of Engineering Examination for Civil Engineering and will be delivered by experienced professors and lecturers from tertiary educational institutions.

OBJECTIVES

This preparatory course is aimed to help applicants in their preparation for the Fundamentals of Engineering Examination for Civil Engineering by providing revision of all the topics stipulated.
COURSE TOPIC

CE 101 Mechanics of Materials
- Mechanics of Materials
  Strength, stiffness and deformability; Stress-strain relations; durability and brittle fracture; time-dependent properties; creep, creep rupture; relaxation; cyclic load behaviour.
- Concrete Technology
  Concrete-making materials, properties of fresh and hardened concrete, mixing, placing, and curing, mix design, destructive and non destructive tests, quality control, durability, and special concrete.
- Steel
  Basic metallurgy, mechanical properties and applications, welding technology and corrosion.

CE 102 Structural Mechanics
- Structural Mechanics
  Statics and kinetics of particles, equilibrium of rigid bodies, kinematics and plane motion of rigid bodies, analysis of simple trusses and beams, analysis of structural members subjected to tension, compression, torsion, and bending, including such fundamental concepts as stress, strain, and elastic behaviour. Bar forces in compound and complex trusses. Bending moment, shear and axial forces of beams and frames.

CE 103 Structural Analysis
- Structural Analysis

CE 104 Soil Mechanics
- Basic geology, unified soil classification system, mechanical properties, effective stress principle, shear strength, compressibility, and seepage and consolidation; Mohr-Coulomb failure criterion (drained and undrained), settlement calculations, rate of consolidation using Terzaghi theory.

CE 105 Fluid Mechanics
- Fluid Statics
  Fluid properties; hydrostatic pressure and thrust; buoyancy; stability of floating bodies.
- Fluid Motion
  Continuity equations; Bernoulli’s equation; linear momentum equation
- Similitude
  Dimensional analysis; design of hydraulic models.
CE 201 Reinforced and Prestressed Concrete Structures

- **RC Design**

- **Prestressed Concrete Design**
  Basic concepts of prestressing. Materials and prestressing systems. Prestressed losses and time dependent deformation. Behaviour and design of members subject to flexure, shear and combined axial and bending action.

CE 202 Steel and Composite Structures

- **Steel Design**

- **Composite (Steel-Concrete) Design**
  Structural modeling and design concepts. Moment capacity and shear resistance, full and partial connection of composite beams. Design of composite slab. Design of composite columns.

CE 203 Geotechnical Engineering

- **Slope stability and Earth Retaining Structures**
  Introduction to slope stability and earth retaining structures; slopes and embankments; earth pressure and retaining structures; deep excavations; calculation of active and passive earth pressures; design considerations pertaining to deep excavations.

- **Foundation Engineering**
  Site investigation and interpretation of soil reports; shallow foundations and deep foundations; selection of appropriate foundation type; capacity and settlement requirements.

CE 204 Transportation

- **Transportation Engineering**
  Transportation systems, planning and management; geometric design of roads and intersections; design of flexible and rigid pavements.

- **Traffic Engineering**
  Traffic flow studies; traffic data analysis; traffic management; highway and intersection capacity; traffic signal control. Parking.
CE 205 Hydraulics and Hydrology

- **Hydraulics**
  Friction and minor losses in pipe flow; pipe and pump systems; pipe network analysis; open channel flow; uniform flow, Manning’s equation; critical flow; energy and momentum principles; hydraulics jumps; gradually varied flows, backwater computation.

- **Hydrology**
  Processes in the hydrology cycle: basic meteorology, rainfall precipitation, evaporation and transpiration, infiltration, sub-surface flow, surface runoff, streamflow measurement and hydrograph analysis; unit hydrograph principles and applications; frequency analysis of rainfall or flood data; reservoir and channel flood routing; urban storm drainage design, flood peak estimation.

CE 206 Environmental Engineering

- **Environmental Engineering**
  Basic physical, chemical and biological water quality parameters; physical, chemical, and biological processes for water and wastewater treatment; water treatment principles and design; water distribution systems; wastewater collection and pumping systems; wastewater treatment design; pretreatment, primary, secondary, tertiary treatment, and anaerobic digestion.

**PROGRAMME SCHEDULE**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Module Code(s)</th>
<th>Lecturer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tue, 26 Jun 2018</td>
<td>6.30pm – 9.30pm</td>
<td>CE 105/CE205</td>
<td>Assoc. Prof. Vladan Babovic</td>
</tr>
<tr>
<td>Thur, 28 Jun 2018</td>
<td>6.30pm – 9.30pm</td>
<td>CE 105/CE205</td>
<td>Assoc. Prof. Vladan Babovic</td>
</tr>
<tr>
<td>Sat, 30 Jun 2018</td>
<td>9.00am – 1.30pm</td>
<td>CE 105/CE205</td>
<td>Assoc. Prof. Vladan Babovic</td>
</tr>
<tr>
<td>Thur, 5 Jul 2018</td>
<td>9.00pm – 9.45pm</td>
<td>CE 104 / CE 203</td>
<td>Prof. Leung Chun Fai</td>
</tr>
<tr>
<td>Sat, 7 Jul 2018</td>
<td>6.00am -1.30pm</td>
<td>CE 104 / CE 203</td>
<td>Prof. Leung Chun Fai</td>
</tr>
<tr>
<td>Tue, 10 Jul 2018</td>
<td>6.00pm – 9.45pm</td>
<td>CE 104 / CE 203</td>
<td>Prof. Leung Chun Fai</td>
</tr>
<tr>
<td>Sat, 14 Jul 2018</td>
<td>9.00am – 1.30pm</td>
<td>CE 204</td>
<td>Dr Ong Ghim Peng, Raymond</td>
</tr>
<tr>
<td>Tue, 17 Jul 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 102 / CE 103</td>
<td>Assoc. Prof. Ang Kok Keng</td>
</tr>
<tr>
<td>Sat, 21 Jul 2018</td>
<td>9.00am-12.30pm</td>
<td>CE 102 / CE 103</td>
<td>Assoc. Prof. Ang Kok Keng</td>
</tr>
<tr>
<td>Tue, 24 Jul 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 206</td>
<td>Prof. Ong Say Leong</td>
</tr>
<tr>
<td>Thur, 26 Jul 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 206</td>
<td>Prof. Ong Say Leong</td>
</tr>
<tr>
<td>Sat, 28 Jul 2018</td>
<td>9.00am – 12.00pm</td>
<td>CE 206</td>
<td>Prof. Ong Say Leong</td>
</tr>
<tr>
<td>Tue, 31 Jul 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 201</td>
<td>Prof. Tan Kiang Hwee</td>
</tr>
<tr>
<td>Thur, 2 Aug 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 201</td>
<td>Prof. Tan Kiang Hwee</td>
</tr>
<tr>
<td>Sat, 4 Aug 2018</td>
<td>9.00am-1.30pm</td>
<td>CE 101</td>
<td>Assoc. Prof Tam Chat Tim</td>
</tr>
<tr>
<td>Tue, 7 Aug 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 201</td>
<td>Prof. Tan Kiang Hwee</td>
</tr>
<tr>
<td>Tue, 14 Aug 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 202</td>
<td>Assoc. Prof. Pang Sze Dai</td>
</tr>
<tr>
<td>Thur, 16 Aug 2018</td>
<td>6.30pm-9.30pm</td>
<td>CE 202</td>
<td>Assoc. Prof. Pang Sze Dai</td>
</tr>
<tr>
<td>Sat, 18 Aug 2018</td>
<td>9.00am – 12.00pm</td>
<td>CE 202</td>
<td>Assoc. Prof. Pang Sze Dai</td>
</tr>
</tbody>
</table>
CW OF SPEAKERS

Assoc Prof Vladan Babovic


Dr. Babovic is Editor in Chief for Journal of Hydroinformatics and is currently serving as Chairman of joint IWA-IAHR-IAHS Section on Hydroinformatics. His research interests include hydroinformations, artificial intelligence, machine learning, data mining and knowledge discovery, data assimilation and computational hydraulics. He has authored and co-authored more than 40 book chapters and papers in peer reviewed international journals and more than 40 peer reviewed conference papers. Dr. Babovic presented keynote/invited lectures in 15 international conferences and served on organizing and advisory committee for many international conferences.

Prof Leung Chun Fai

Professor Leung Chun Fai, from the Department of Civil Engineering at the National University of Singapore, is a registered professional engineer (geotechnical specialist) in Singapore and a chartered civil engineer in UK. He has served as a geotechnical consultant for many major projects in Singapore and overseas. He has delivered many keynote/invited lectures at international conferences and serves on the Editorial Board of several journals. Professor Leung is currently a technical committee member of ISO Jackup Foundation Panel. He was the Chairman of International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee TC2 on Geotechnical Physical Modeling from 2002 to 2005.

Assoc. Prof. Pang Sze Dai

Dr. PANG Sze Dai graduated from the National University of Singapore with B.Eng. (First Class Honours) and M.Eng. degrees in 2001 and 2002 respectively under the Accelerated Master’s Program (AMP), and from the Northwestern University with Ph.D. degree in 2005. He researched on the behaviour of profiled steel-concrete composite structures subjected to blast loading for his M.Eng thesis and on the size effect arising from energetic and probabilistic fracture mechanics in the mechanical properties of quasi-brittle materials for his Ph.D dissertation.
Assoc Prof Tam Chat Tim

Dr. Tam studies for his BE (Hons) and ME in Australia and his Ph.D in Canada. After working for three years with the Hydro-Electric Commission in Hobart and a consultancy firm in Kuala Lumpur, he joined the Department of Civil Engineering of the University of Malaya in 1963. Between 1968 and 1972, he was on leave from UM to obtain his Ph.D in Material Science on the topic of chemical admixtures in concrete. After returning, he was Head of the Department before leaving in 1979 to join the then University of Singapore, now National University of Singapore, and held the position of Vice-Dean before his retirement in 1996. Currently, he is an Associate Professorial Fellow to continue with research on concrete materials and construction.

Prof Ong Say Leong

Professor Ong Say Leong obtained his BEng (Civil Engrg) from Singapore and his MESc (Biochemical Engrg) and PhD (Civil Engrg) from Canada.

Professor Ong has taught courses in water and wastewater engineering, advanced wastewater treatment, environmental modeling, water quality management, industrial wastewater control, hydraulics and computing. He has published over 250 technical papers in the area of water beneficiation.

Professor Ong is a registered professional engineer and has been involved in consulting jobs on water and wastewater treatment systems and water quality management. He is active in the professional circle and is serving in several environmental engineering committees. These includes Governing Board of Director of the Water Environment Federation (USA), Head of PUB Internal Audit Panel for NEWater and Water Supplies, and Chairman of Singapore Technical Committee on Drinking Water Quality Standards. Professor Ong also serves as Editor/Associate Editor/Editiial Board Member of 10 international journals in the area of water environment.

Assoc Prof Ang Kok Keng

Associate Professor Ang received his B.Eng degree from the University of Singapore, M.Eng from the National University of Singapore and PhD from the University of New South Wales, Australia. He has been a staff member of the Department of Civil Engineering at the National University of Singapore since March 1987.

Associate Professor Ang has taught courses in Computing, Structural Mechanics, Structural Steel Design, Structural Analysis and Finite Element Methods. His research interests include structural stability and vibration, shape and vibration control of smart adaptive structures, analysis and design of very large floating structures, computational mechanics, finite element method and meshless methods, and have published about 60 technical papers in these areas in various international journals and conferences. He won the IES/IStructE Best Structural Paper Award in 1994 for his work on development of buckling formulas and design charts for straight members and plates.

Professor Ang is a Singapore registered professional engineer since 1991 and has been involved in consulting jobs for the local industries.
Prof Tan Kiang Hwee

Professor Tan Kiang Hwee has been a faculty member of the Department of Civil Engineering at the National University of Singapore (NUS) since July 1981. He obtained his doctorate degree from the University of Tokyo, Japan in 1985.

Professor Tan specialises in the area of structural concrete and composites and has taught courses in reinforced and prestressed concrete design at both undergraduate and postgraduate levels. He has carried out extensive research on concrete beams with transverse openings, external prestressing, and fibre-reinforced polymer (FRP) reinforcement and systems. He has published more than 170 refereed technical papers, including a book entitled "Beams with Openings: Analysis & Design" (CRC Press LLC, USA, 1999). He serves on the editorial boards of eight international journals including the ASCE Journal of Materials in Civil Engineering (USA), ASCE Journal of Composites for Construction (USA), ICE Structures & Buildings Journal (UK), JCI Journal of Advanced Concrete Technology (Japan) and Concrete and Computers (Korea).

Professor Tan is Vice-Chairman of the International Committee on Concrete Model Code for Asia, Council Member of International Institute for FRP Composites in Construction, and Founding President of the FRP Society (Singapore). He is a registered Professional Engineer in Singapore since 1991 and is a Fellow of the Institution of Engineers, Singapore (IES), for which he served as Honorary Secretary from 2004 to 2006.

Assistant Professor Ong Ghim Peng Raymond

Dr Ong Ghim Ping Raymond is an Assistant Professor in the Department of Civil Engineering at the National University of Singapore (NUS). He graduated with a B.Eng (First Class Honours) with a minor in Business from the National University of Singapore in 2003 and obtained his PhD in civil engineering from the National University of Singapore in 2007. Prior to his current appointment, he worked as a postdoctoral research associate in the School of Civil Engineering at Purdue University from 2007 to 2008, and was appointed visiting assistant professor in the same university in 2009.

Dr Ong’s research interests include: transportation infrastructure and asset management, multimodal transport infrastructure management, and pavement engineering and management. He has published over 100 technical papers in various journals and conferences in these areas, and is currently serving in various scientific committees in the Transportation Research Board of the National Academies, the America Society of Civil Engineers, the American Society of Testing and Materials, and the International Society of Maintenance and Rehabilitation of Transport Infrastructures (iSMARTi). He has received several scientific awards in recognition to his research achievements, including the Alfred Noble Prize, the Hanjin Prize and the Takeuchi Yoshio Award.
Registration Form

PREPARATORY COURSE FOR PE FUNDAMENTALS OF ENGINEERING EXAMINATION
(CIVIL ENGINEERING)

Date: 26 June 2018 – 14 August 2018
Time: Please refer to Programme Schedule
Venue: IES Academy / National University of Singapore (To Be Confirmed)
CPD Programme: 12 STUs (To Be Confirmed)
Fees *: $2568.00 (IES Members) $2782.00 (Non-Members)

Please register online at IES Website, or fax the completed form by 18 June 2018 before 3pm to:

Qiao Ting
IES Academy
80 Jurong East Street 21
#04-10 Devan Nair Institute For Employment and Employability
Singapore 609607
Tel: 6461 1238, Fax 6563 6030

Participant Details

Name : ____________________________ NRIC : ____________________________
Company : ____________________________ Designation: ____________________________
Address 1 : ____________________________ (For mailing of invoice and receipt)
Address 2 : ____________________________ (For mailing of Certificate)
Postal Code : ____________________________ Sex : __________ Male / Female
Mobile No. : ____________________________ Fax : ____________________________
Email : ____________________________________________________________
(For sending of confirmation email)

Please indicate:

☐ IES members IES M’ship No.: ________________ P.E. No.: ________________ (if applicable)
☐ Non-members ☐ Sponsored by company ☐ Vegetarian Meal

**Please indicate in REMARKS column if you are applying for IES membership.

Contact Person Details (if different from participant)

Name : ____________________________ Designation: ____________________________
Tel : ____________________________ Fax: ____________________________
Email : ____________________________________________________________

Payment Details

Bank / Cheque No.: ____________________________ Amount ($) : ____________________________
☐ Invoice to Company
* All Fees are inclusive of 7% GST.
Cheque should be made payable to: "Engineers Singapore Pte Ltd ".
Remarks: ____________________________________________________________

Acceptance of Terms and Conditions for Registrations of IES Academy’s Events

I agree to abide by the Terms and Conditions for Registration of IES Academy’s Events.

Name : ____________________________ Signature : ____________________________
TERMS & CONDITIONS COURSE REGISTRATION

Registration

Any registration, whether on-line or fax will be on a first-come-first-served basis and will only be confirmed upon receipt of full payment by Engineers Singapore Pte Ltd unless otherwise invoice to company. All registrations must be submitted with duly completed registration form.

Closing Date & Payment

The closing date of the event will be 1 week prior to event commencement date or earlier. Cheques should be crossed ‘A/C payee only’ and made payable to ‘Engineers Singapore Pte Ltd’, with the Title of The Event indicated clearly written on the back of the cheque, and submitted with the duly completed registration forms to:

Att: _____________
IES Academy@Jurong East
Devan Nair Institute for Employment and Employability,
80 Jurong East Street 21, #04-10
Singapore 609607

Confirmation of Registration

Confirmation of registration will be given at least 1 week before the commencement date via email. If you do not receive the said confirmation email, you are required to contact IESA at 6463 9211 during office hours.

IESA reserves the right to allow only confirmed registrants to attend the Event.

Withdrawals/Refunds of Fees

Written notice at least 1 week in advance before the commencement of the event. Full course fee shall be refunded subjected to 4.5% transection charge.

- NO refund otherwise.

No show of participant would not be accepted as a valid reason for withdrawal/refund. One time replacement is allowed only if written notice is received by us at least 1 week before the commencement of the event. However, when an IES member is replaced by a non-member, the participant has to pay the difference in the relevant fees.

Cancellation/Postponement

Changes in Venue, Dates, Time and Speakers for the Events can occur due to unforeseen circumstances. IES reserves the full rights to cancel or postpone the Event under such circumstances without prior reasons. Every effort, however, will be made to inform the participants or contact person of any cancellation or postponement.

Fees will be refunded in FULL if any Event is cancelled by IESA.

UTAP (Union Training Assistance Programme) is an individual skills upgrading account especially for NTUC members. As a member, you enjoy UTAP funding at 50% of the unfunded course fee capped at $250 every year.

SkillsFuture Credit (SFC) “All Singaporeans aged 25 and above can use their $500 SkillsFuture Credit from the government to pay for a wide range of approved skills-related courses. Visit the SkillsFuture Credit website (www.skillsfuture.sg/credit) to choose from the courses available on the SkillsFuture Credit course directory.” Please visit https://www.ies.org.sg/iesa/Skillsfuture_&_UTAP.pdf for more information on SFC & UTAP claim.

PERSONAL DATA PROTECTION ACT

I consent to the processing by Institution of Engineers, Singapore of personal data, including sensitive personal data as defined in the Data Protection Act 2014, about me for the proper purposes of Institution of Engineers, Singapore (IES). I undertake to observe the provisions of the Data Protection Act 2014 in relation to any personal data I may myself hold and process as a Members of Institution of Engineers, Singapore, and I agree to indemnify Institution of Engineers, Singapore from liability for any claims or damages that may arise from the processing of this data. For more information kindly refer to: www.ies.org.sg/PDPA.

Enquiries

For further enquiries, please contact IESA general office at Tel: 6463 9211.