ECCOMAS:
European Community
on Computational Methods
in Applied Sciences

ECCOMAS
Thematic Conference

CompWood 2019

JUNE 17–19, 2019 | VÄXJÖ | SWEDEN

International Conference on
Computational Methods in Wood Mechanics – from Material Properties to Timber Structures

Programme

Lnu.se/en/compwood2019
#compwood2019

Keynote lectures

Monday, June 17

IKEA

CHAIRMAN: **ANDERS OLSSON**

09:30 **Keynote lecture Kjell Arne Malo**
NTNU Norwegian University of Science and Technology
Utilizing Experiments and Numerical Models as basis for Structural Engineering

10:00 **Keynote lecture Philipp Dietsch**
Chair of Timber Structures and Building Construction; Technical University of Munich
Experimental characterization of material properties for numerical modelling of timber engineering applications

Tuesday, June 18

IKEA

CHAIRMAN: **JOSEF FÜSSL**

09:00 **Keynote lecture Patrick Perrè**
LGPM, CentraleSupélec, Université Paris-Saclay; LGPM, CentraleSupélec, CEBB
Coupled heat and mass transfer in wood and wood-based products: macroscopic formulation, upscaling and multiscale modelling

Wednesday, June 19

IKEA

CHAIRMAN: **THOMAS BADER**

09:00 **Keynote lecture Erik Serrano**
Division of Structural Mechanics, Lund University
Cross laminated timber plates with a notch at the support

CHAIRMAN: **JOSEF FÜSSL**

14:30 **Keynote lecture Falk Wittel**
Institute for Building Materials, ETH Zurich
Numerical Optimization of Glued Laminated Timber with Mixed Species

Linnæus University

TU WIEN imws

Programme, June 16–19, 2019

Sunday, June 16

18:00– 20:00 Welcome reception at Lagerlunden Bistro & Bar at Elite Stadshotellet, Kungsgatan 6, 351 04 Växjö

Monday, June 17

IKEA

09:00 Opening Conference Chairs

09:10 Welcome by Björn Johannesson, Pro-Dean of Faculty of Technology, Linnaeus University

09:20 Welcome by Bo Frank, Lord Mayor, Växjö Kommun

CHAIRMAN: **ANDERS OLSSON**

09:30 **Keynote lecture Kjell Arne Malo**, Utilizing Experiments and Numerical Models as basis for Structural Engineering

10:00 **Keynote lecture Philipp Dietsch**, Experimental characterization of material properties for numerical modelling of timber engineering applications

10:30 Coffee

Session Computational methods for connections and structures

SÖDRA

CHAIRMAN: **JOSEF FÜSSL**

11:00 Wood crushing modelling for timber joint engineer problems
Bocquet, Jean-François, LERMAB

11:20 Numerical modeling of dowel-type connections in soft- and hardwoods including the rope effect
Schweigler, Michael, Department of Building Technology, Linnaeus University, Växjö

11:40 Test-analyses comparisons of a stabilizing glulam truss for a tall building
Landel, Pierre, RISE

Session Computational and experimental methods for wood materials

NCC

CHAIRMAN: **LECH MUSZYNSKI**

11:00 Computational Wood Mechanics using the Material Point Method
Nairn, John, Oregon State University

11:20 Phase field method-based modeling of fracture in wood
Pech, Sebastian, Vienna University of Technology, Institute for Mechanics of Materials and Structures

11:40 Experimental study on the creep response of Chilean Radiata Pine wood
Guzmán, Carlos Felipe, Universidad de Santiago de Chile

12:00 Numerical and experimental study on light-frame test-modules for modular-based timber structures
Ormarsson, Sigurdur, Linnaeus University, Department of Building Technology

12:20 Approximation of stresses in multi-span CLT beams based on refined zigzag theory
Sieder, Raimund, TU Graz

12:40 Numerical study on de elastic buckling of CLT Walls subjected to compressive loads
Pina, Juan Carlos, Departamento de Ingeniería en Obras Civiles, Universidad de Santiago de Chile

12:00 Improvement of ductility and toughness of wood polypropylene-composites
Koubaa, Ahmed, Université du Québec en Abitibi-Témiscamingue

12:20 A numerical and experimental methodology to investigate morphological changes in wood exposed to fire temperatures
Fortino, Stefania, VTT Technical Research Centre of Finland Ltd

12:40 Modeling of wood under combination of normal stresses with rolling shear stress
Akter, Shaheda T., Linnaeus University

13:00 Lunch

Session Connections and timber structures

SÖDRA

CHAIRMAN: **MICHAEL DORN**

14:00 Close-up strain measurement along the mechanical interface of self-tapping screws joined with timber by means of electronic speckle pattern interferometry
Kumpenza, Cedou, University of Natural Resources and Life Sciences Vienna (BOKU)

14:20 Reliability analyses using finite element models of trussed timber structures with dowelled connections
Wydler, Jonas, ETH Zürich

14:40 4D self-shaping mechanisms for achieving double-curved wooden structures
Grönquist, Philippe, Empa, Laboratory for Cellulose & Wood Materials

15:00 A New Macro Modeling Approach in Structural Analysis of Integrally-Attached Timber Plate Structures
Rezaei Rad, Aryan, École Polytechnique Fédérale de Lausanne (EPFL)

15:20 Structural design methods for tall timber towers with large wind turbine
Dölerud, Erik, Modovion

15:40 Creep – Transfer of complex rheological behaviour into timber engineering
Hochreiner, Georg, TU Wien

Session Cross-laminated timber

NCC

CHAIRMAN: **HENRIK DANIELSSON**

14:00 Modelling principles of glued-in rods in cross laminated timber
Azinović, Boris, Slovenian National Building and Civil Engineering Institute, ZAG Ljubljana

14:20 A calibrated model for experimental hysteretic results of wall joints in CLT panels
Yanez, Sergio J., Universidad de Santiago de Chile

14:40 Strengthening of Cross-Laminated Timber by adding aluminium plates
Turesson, Jonas, Luleå University of Technology

15:00 Simulation of Alternative Load Paths After a Wall Removal in a Platform-Framed Cross-Laminated Timber Building
Huber, Johannes, Luleå University of Technology

15:20 Experimental Analysis and Numerical Modelling of Post-Tensioned CLT Shear Walls with Energy Dissipators
Chen, Zhiyong, FPInnovations

15:40 A Finite Element Approach to Investigating the Influence of Knots on Cross Laminated Timber
O'Donnell, Fiona, University of Massachusetts Amherst

16:00 Coffee

Session Modelling and testing of connections

SÖDRA

CHAIRMAN: **THIERRY DESCAMPS**

16:30 Simplified mechanical models for timber connections in fire
Palma, Pedro, Empa – Swiss Federal Laboratories for Materials Science and Technology

16:50 Numerical Modelling and Experimental Investigation of Compressed Wood Dowel Connected Laminated Timber Members
Sotayo, Adeayo, University of Liverpool

17:10 Numerical simulation of full-culm bamboo structural member connections
Mouka, Theodora, The Hong Kong University of Science and Technology

17:30 Long-term finite element analysis of timber-steel composite joint
Nie, Yatong, University of New South Wales

17:50 Tensile loading tests steel plated inserted joint with drift pin on CLT
Kambe, Wataru, Kanto Gakuin University

18:10 Nonlinear 1D component based and 3D continuum-based finite element analysis of hybrid timber-steel beam to column connections
Nouri, Farshid, University of New South Wales

Session Simulation and testing of materials and structures

NCC

CHAIRMAN: **PETER NIEMZ**

16:30 In-plane Elastic Behavior of Transparent Wood Composite Measured with Digital Image Correlation
Jungstedt, Erik, Kungliga Tekniska Högskolan

16:50 Experimental and Computational Models of Bamboo Reinforcement
Avudaiappan, Siva, Universidad de Santiago de Chile

17:10 Multi-Objective and Multi-Criteria Approach for Value-Driven Design in Industrialized Residential Multi-Storey Timber-Building
Movaffaghi, Hamid , Jönköping University, School of Engineering, Department of Civil Engineering and Lighting Design

17:30 Analytical evaluation of bond models for glued-in rods in timber
Toumpanaki, Eleni, Centre for Natural Material Innovation, University of Cambridge

17:50 Determination of shear modulus (GLR) for seven boreal species using a bending test and non-destructive methods (ultrasound and torsional resonance methods)
Jarboui, Wiem, University of Quebec in Abitibi-Témiscamingue (Quebec, Canada)

Tuesday, June 18

IKEA

CHAIRMAN: **JOSEF FÜSSL**

09:00 **Keynote lecture Patrick Perrè**, Coupled heat and mass transfer in wood and wood-based products: macroscopic formulation, upscaling and multiscale modelling

Session Modelling moisture in wood

CHAIRMAN: **JOSEF FÜSSL**

09:30 Heat and Mass Transfer Model for Wood under real climate conditions
Autengruber, Maximilian, TU Wien

09:50 Finite-Element-Modelling of moisture-induced cracks in wood and wooden structures
Fleischhauer, Robert, Institute for Structural Analysis, Technische Universität Dresden

10:10 A multi-phase coupled transient heat and moisture transport model in wood based on the hybrid mixture theory
Mmari, Winston, Linnaeus University

10.30 Coffee

Session Brittle failure of wood

SÖDRA

CHAIRMAN: **JOSEF EBERHARDSTEINER**

11:00 Investigations of crack formation and delamination in bonded wooden elements in variable climatic conditions in the interior
Niemz, Peter, Eidgenössische Technische Hochschule, Zürich, Institute for Building Materials

11:20 A review of computational methods to describe the strength and failure behavior of wood and wood-based products and their embedment into a holistic design approach
Füssl, Josef, Institute for Mechanics of Materials and Structures, TU Wien

11:40 Experimental evaluation of fracture properties and cohesion law of wood-adhesive bond-line in mode II using end-notched flexure
Pečnik, Jaka Gašper, University of Primorska

12:00 Numerical modeling of wood-adhesive bond-line in mode II for beech wood glued by various adhesives
Sebera, Václav, InnoRenew CoE

Session Fibre orientation – modelling and grading of wood

NCC

CHAIRMAN: **GUILLAUME POT**

11:00 Assessment of the error of fiber orientation measurement obtained by laser scanning on several European hardwood and softwood species
Besseau, Benoît, LaBoMaP (ENSAM)

11:20 Prediction of tensile strength in sawn timber by means of surface laser scanning and dynamic excitation
Briggert, Andreas, Department of Building Technology, Linnaeus University, Växjö

11:40 Determination of Global Modulus of Elasticity of Timber by Using Fiber Orientation and Proportion of Latewood
Cheng, Yu-Jie, Department of Power Mechanical Engineering, National Tsing Hua University

12:00 Automatic detection of pith location along boards of Norway spruce on the basis of data from optical scanning of longitudinal surfaces
Habite, Tadios, Department of Building Technology, Linnaeus University, Växjö

12:20 Strength and fracture analysis of shear mode III in cross laminated timber
Danielsson, Henrik, Division of Structural Mechanics, Lund University

12:40 An experimental and numerical investigation of fracture characteristics of acetylated Scots Pine
Forsman, Karin, Division of Structural Mechanics, Lund University

12:20 Modeling fiber direction around knots in structural timber
Hu, Min, Department of Building Technology, Linnaeus University, Växjö

12:40 Investigation of density variations in moulded wood tubes using gamma-ray CT and correlation with load-bearing behavior
Hartig, Jens, Technische Universität Dresden, Institute of Steel and Timber Construction

13:00 Lunch

Session Computational analysis of timber structures

SÖDRA

CHAIRMAN: **ERIK SERRANO**

14:00 Critical discussion on the application of the Finite Element Method in design and verification of timber structures
Jockwer, Robert, Chalmers University of Technology

14:20 Industrialization of the design and production process of wooden trusses
Kromoser, Benjamin, Institute of Structural Engineering, University of Natural Resources and Life Sciences

14:40 Numerical modelling of light-frame timber walls with focus on out-of-plane deformations and elastic-plastic fastener force distribution
Kuai, Le, Linnaeus University

15:00 Numerical analysis to study how out-of-plane imperfections affect the ultimate load bearing capacity of slender long span timber trusses
Vessby, Johan, Karlstad University

15:20 Investigations on transversal load sharing in Timber-Concrete floors
Holschemacher, Klaus, Structural Concrete Institute, Leipzig University of Applied Sciences

15:40 Structural behaviour of hybrid floor systems: cold-formed steel and sustainable floorboards
Malek, Sardar, University of Technology Sydney (UTS)

Session Modelling of wood products

NCC

CHAIRMAN: **STEFANIA FORTINO**

14:00 Timoshenko beam with enhanced stress recovery and constitutive relations describing the effects of variable grain direction on the behavior of a GLT beam
Balduzzi, Giuseppe, IMWS, TU Wien - Vienna University of Technology

14:20 On the question whether the volume of glulam bending members changes their reliability
Frese, Matthias, Karlsruher Institut für Technologie - Holzbau und Baukonstruktionen

14:40 Hybrid GLT-LVL Glulam – Modelling and Experiments
Dobnikar, Jan, MPA Stuttgart

15:00 Influence of the material thickness and microstructure on the mechanical properties and the pressure distribution in timber constructions
Jamrozy, Michael, Department of Materials Test Engineering (WPT), TU Dortmund University

15:20 2D computational modeling of the influence of transverse reinforcement on perpendicular to grain stress in double tapered glulam beams
Al Sabouni-Zawadzka, Anna, Warsaw University of Technology, Faculty of Civil Engineering

15:40 Numerical modelling of beam-beam connection systems using compressed wood plates and dowels
Mohseni, Iman, National University Ireland Galway

16:00 Coffee

Session Simulation of materials and structures

SÖDRA

CHAIRMAN: **ANDERS OLSSON**

16:30 Modelling wood anisotropy by the mean of the Discrete Element Method for cutting process simulation
Curti, Rémi, LaBoMaP, Arts et Métiers Paristech

16:50 Modeling inhomogeneities of veneers with a grayscale mapping approach
Zerbst, David, Mercedes Benz Cars RD

17:10 Notches in wood at arbitrary beam location – numerical modelling and challenges
Kunecký, Jiří, Institute of Theoretical and Applied Mechanics, v.v.i., Czech Academy of Sciences

17:30 In-plane buckling analysis of transversely loaded timber beams
Petersson, Hans, Linnaeus University

Session Timber composite and wood material characterisation

NCC

CHAIRMAN: **KJELL ARNE MALO**

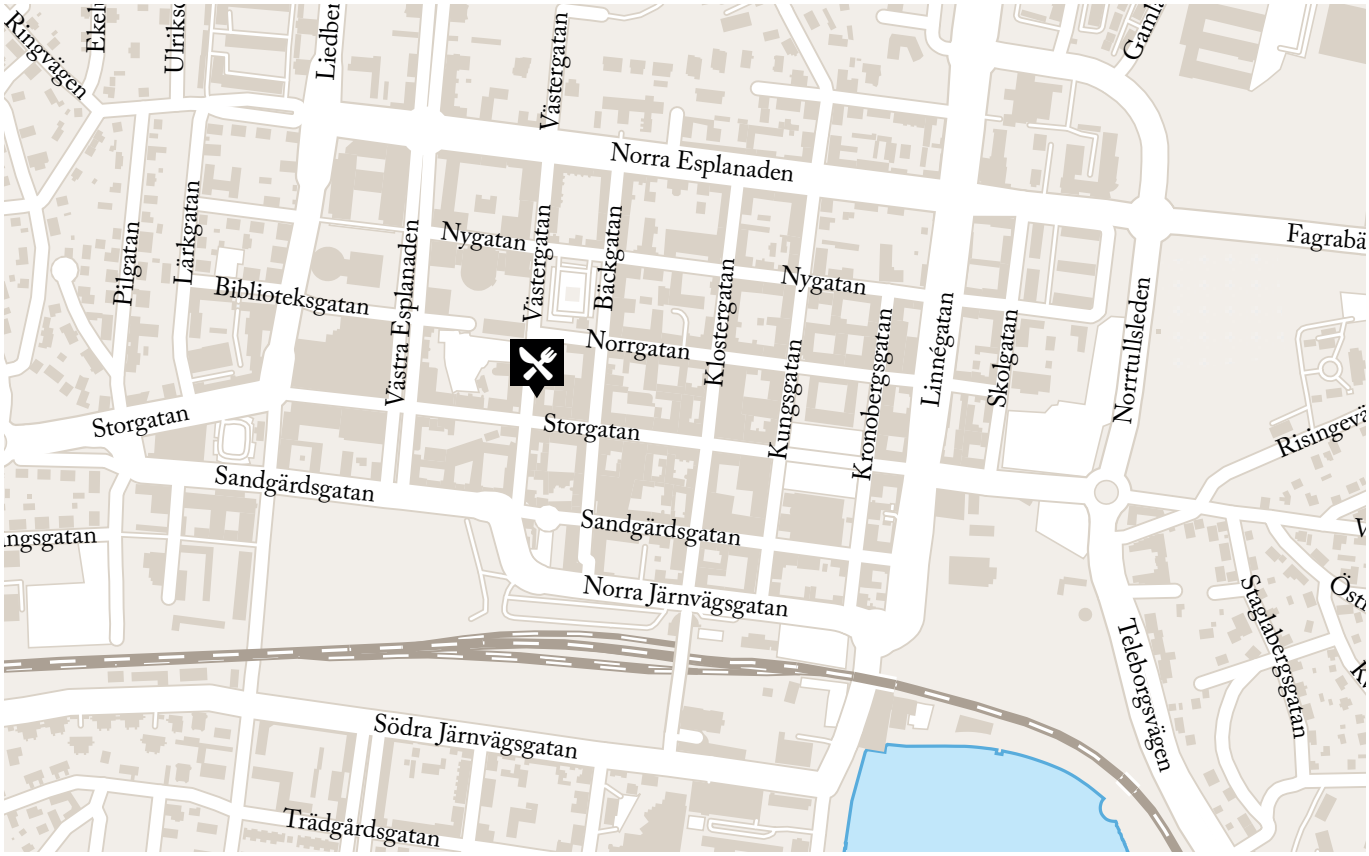
16:30 Development of an Innovative Multifunctional Roof and Ceiling Design in Timber-Concrete Composite Construction
Seck, Claudia, University of Kaiserslautern

16:50 Determination of Moduli of Elasticity of Latewood and Transition Latewood of Japanese Cedar by Using Digital Image Analysis
Kuo, Tzu-Yu, Department of Power Mechanical Engineering, National Tsing Hua University

17:10 Hybrid glulam beam made of beech and spruce laminations – experimental and numerical investigation
Kržan, Meta, The Slovenian National Building and Civil Engineering Institute, Section for Timber Structures

17:30 Mechanical Properties of Oil Palm Wood (Elaeis guineensis JACQ.)
Fruehwald-Koenig, Katja, University of Applied Sciences Ostwestfalen-Lippe, Department 7

20:00–23:00 **Conference Banquet at PM & Vänner restaurant, Västergatan 10, 352 31 Växjö**



Wednesday, June 19

IKEA

CHAIRMAN: **THOMAS BADER**

09:00 **Keynote lecture Erik Serrano**, Cross laminated timber plates with a notch at the support

Session Cross laminated timber structures

CHAIRMAN: **THOMAS BADER**

09:30 Global Vibration Modes of a Four-Story Wood Building
Brandt, Anders, University of Southern Denmark

09:50 Numerical Optimization of Novel Connections for Cross-laminated Timber Buildings
Loss, Cristiano, Department of Wood Science, The University of British Columbia

10:10 Nonlinear computational modelling of cross-laminated timber buildings
Saavedra Flores, Erick, Universidad de Santiago de Chile

10:30 Coffee

Session Simulating the mechanical behaviour of connections

SÖDRA

CHAIRMAN: **SIGURDUR ORMARSSON**

11:00 Strength and stiffness of hardwood joints experimental and numerical investigations
Lemaître, Romain, LERMAB

11:20 Simplified calculation model for interconnected timber elements using wood-wood connections
Gamerro, Julien, Laboratory for Timber Constructions EPFL

11:40 Mechanics of timber – to - timber shear connections with metal fasteners considering perfect plasticity and large deformations: The rope effect
Guggenberger, Werner, Institute of Structural Analysis, Graz University of Technology

12:00 3D Finite Element Model for Shear Stiffness of Wood-Wood Connections for Engineered Timber Panels
Nguyen, Anh Chi, Laboratory for Timber Constructions IBOIS, EPFL

12:20 Connection stiffness and vibration transmission in timber frame structures
Dorn, Michael, Linnaeus University

Session Historic wood applications

NCC

CHAIRMAN: **GEORG HOCHREINER**

11:00 Studies for the Mona Lisa conservation: the implementation of its panel's Digital-Twin
Riparbelli, Lorenzo, University of Florence, DAGRI department, Florence Italy

11:20 A preliminary numerical analysis study on the oriental historic timber-frame buildings
Yeo, Sok Yee, Xi'an Jiaotong University

11:40 Blockhaus buckling analyses: Numerical and analytical models to evaluate the critical load
Sciomenta, Martina, University of L'Aquila

12:00 Design of the Double Step Joint to account the Shear Crack with Cohesive Surfaces
Verbist, Maxime, ISISE, University of Minho, DECivil

12:20 Fracture analysis of single-shear joint equipped with oak dowel loaded perpendicular to grain with eccentricity
Hasníková, Hana, The Institute of Theoretical and Applied Mechanics, Czech Academy of Sciences

12:40 **Lunch**

Session Simulation and testing

IKEA

CHAIRMAN: **JOSEF FÜSSL**

13:30 Hygro-mechanical modelling of glutin-based bond lines in wooden cultural heritage
Konopka, Daniel, Institute for Structural Analysis, Technische Universität Dresden

13:50 On the need for reliable rolling shear characteristics in CLT lamellas and for efficient related test methods
Muszynski, Lech, Oregon State University

14:10 Applying the XFEM method to the simulation of tensile failure in timber boards and finger-joints in a glulam strength model
Tapia Camú, Cristóbal, Materials Testing Institute, University of Stuttgart

CHAIRMAN: **JOSEF FÜSSL**

14:30 **Keynote lecture Falk Wittel,** Numerical Optimization of Glued Laminated Timber with Mixed Species

15:00 Closing

IKEA

15:30-17:30 Site visit

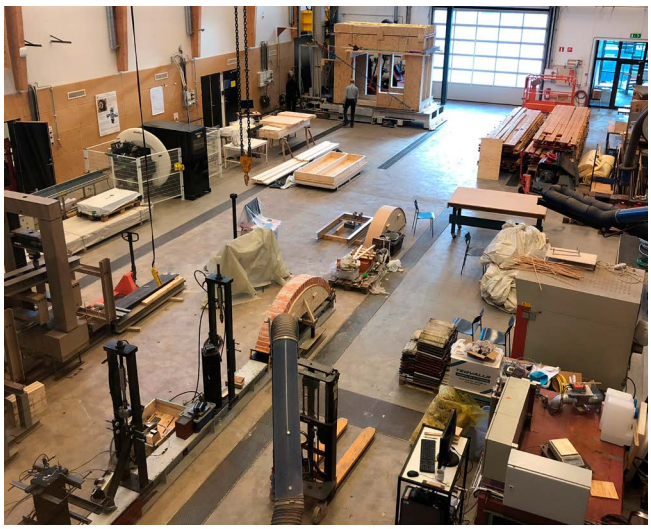
SÖDRA

Due to many request about guided tours, we are pleased to announce a site visit and a presentation about the most interesting ongoing construction of the Växjö municipality building, directly after the scientific program of the conference, on Wednesday June 19, 15.30-17.30, with start at the conference location. Before the site visit, the project will be introduced in a presentation in the lecture room SÖDRA.

The site visit is limited to a maximum number of 30 participants. Please register for the site visit by sending a mail to compwood@lnu.se.

You can find information about the project and pictures from the site

or scan the QR-code



15:30-17:00 Visit of laboratory facilities

HOUSE M

As an alternative to the site visit, we provide opportunity to visit our laboratory facilities on Wednesday June 19, 15:30-17:00. For the guided tour through the laboratory, no registration is required.

Information for lecturers

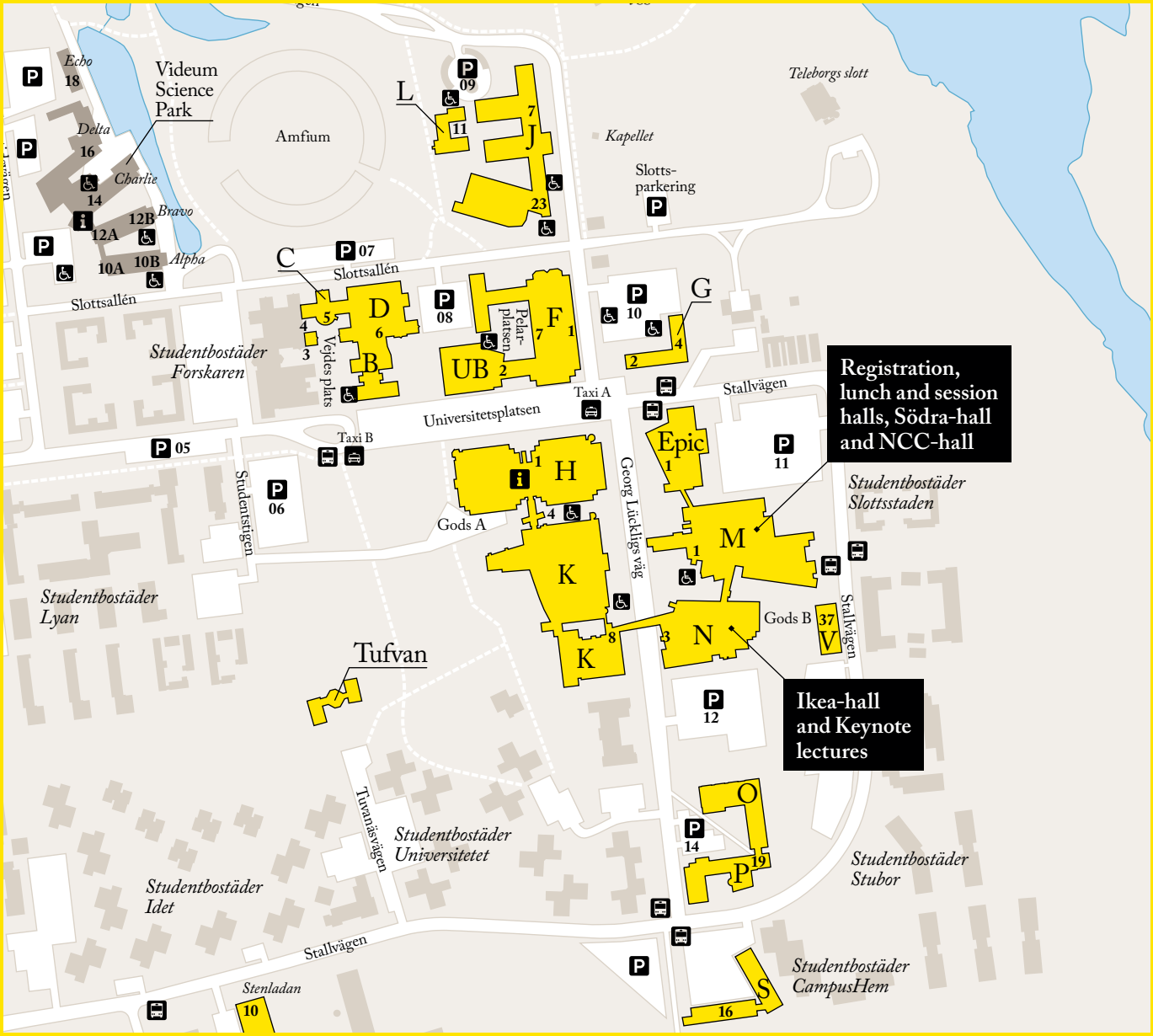
- Please check the time and lecture room of your presentation in the daily programme and on the info boards as there might have been changes.
- Technical staff is assigned to each lecture room for help with technical equipment.
- Each lecture room is equipped with a notebook (Windows 7, Microsoft Office 2016, Acrobat Reader) and a video projector. You are asked to upload your presentation on this notebook as soon as possible, but at the very latest in the break before the session.
- Please be present at least 10 minutes prior to the start of your session and let the chairperson know you are there.
- Please make sure to stay in your session from the beginning on in order to ensure smooth changes between the individual presentations.
- The time allotted for the presentations is 20 min. (incl. discussion) for all presentations. The chairpersons are requested to stop presentations after the allotted time has passed.

Information for Chairpersons

- Please check the time and lecture room of the session you are chairing in the daily programme and on the info boards as there might have been changes.
- All lecturers of your session are requested to approach you in the lecture room at least 10 minutes before the start of the session. This allows you to identify lecturers who have not arrived yet.
- Technical staff is assigned to each lecture room for help with technical equipment. They are responsible for the technical equipment in the lecture room and are ready to help you in any other aspect.
- You are kindly asked to switch between presentations by simply announcing the name of the next presenter and the title of the presentation. Due to the tight schedule, there will not be sufficient time for introducing individual lecturers in a more detailed manner.
- Please do your best to strictly limit the duration of each presentation and discussion to the allotted time.
- If a lecturer is missing, please stick to the original programme, i.e., extend the discussion time of the preceding presentation or allow a break for the duration of the missing lecture(s). This enables participants to listen to chosen individual lectures according to the announced sequence.

Find your way around

Linnæus University



Infocenter	house H, entrance 1

Faculties

Faculty of Health and Life Sciences	house J, K, L
Faculty of Arts and Humanities	house F, G, J, K, M
Faculty of Social Sciences	house F, G, J, K, M, N, P, S
Faculty of Technology	house B, D, M
School of Business and Economics	house K

Lecture halls / conferense rooms

IKEA-hall, N1008A	house N, entrance 3
Södra-hall, M1083	house M, entrance 1
NCC-hall, M1088V	house M, entrance 1

Miscellaneous

Café Astrakan	UB, entrance 2
Café Hus M	house M, entrance 1
Café Karl-Oskar	house F, entrance 7
Café Tufvan	Tufvan
Restaurant Kristina	house H, entrance 1
Restaurant Rasken	house C, entrance 5