



COST TU1402 Training School on the Value of Structural Health Monitoring Information

Objective

The objective of the COST TU1402 Training School is to provide the basic concepts for Value of Structural Health Monitoring (SHM) Information analyses in the framework of Bayesian decision theory. Through the training school, the students will acquire knowledge and skills on probabilistic fundamentals and probabilistic modelling, structural reliability analysis, modelling measurement information and decision analyses. A student who successfully has taken part in the course will be able to:

- Perform Value of SHM Information and decision analyses
- Select appropriate decision analyses types
- Develop and apply probabilistic models of the relevant uncertainties in decision analyses, in structural reliability analyses and for measurement information modelling

Dates and venue

06.11.2017 to 09.11.2017, Villa La Collina – Cadenabbia near Lake Como, Italy. Accommodation in Villa La Collina needs to be reserved by September 15th 2017 (see also “How to get to Villa La Collina (Cadenabbia)” and “Accommodation”).



www.kas.de/villalacollina



Lecturers

- Prof. Michael H. Faber, Aalborg University, Aalborg, Denmark
- Prof. John Dalsgaard Sørensen, Aalborg University, Aalborg, Denmark
- Prof. Jochen Köhler, Norwegian University of Science and Technology, Trondheim, Norway
- Prof. Sebastian Thöns, Technical University of Denmark, Lyngby, Denmark
- Dr. Simona Miraglia, Technical University of Denmark, Lyngby, Denmark
- International Guest Lecturer(s)

Who should attend?

Researchers and engineers involved in probabilistic structural analysis, design and reliability assessment and SHM designers and engineers, engineering managers will benefit from this course. The students are expected to have basic knowledge on basic probability theory, statistics, linear algebra, elementary structural analysis and SHM technologies and methods.

Application, scholarships and registrations

Please send a motivation letter, short CV including the most relevant study transcript via email (sebt@byg.dtu.dk) to Sebastian Thöns. There are 15 TU1402 scholarships with a support of maximum 400,00 Euro available. The cost for course participation is 249,00 Euros including accommodation.



Training School Plan

Day 1	Probabilistic fundamentals and modelling	
	Time	Topics
	08.30-10:00	Introduction and elementary data analysis
	10:30-12:00	Probability theory fundamentals: definitions and axioms of probability, set and probability theory, random variables
	13:00-14:30	Probabilistic Modelling: Maximum Likelihood Method, Regression Analysis
	15:00-17:00	Self-study and reading
Day 2	Structural reliability and measurements	
	Time	Topics
	08.30-10:00	Structural reliability: FORM and simulation methods, load and resistance modelling, structural system reliability analysis
	10:30-12:00	Adaptation of structural reliability with Structural Health Monitoring information and probabilistic modelling of measurements, Part 1
	13:00-14:30	Adaptation of structural reliability with Structural Health Monitoring information and probabilistic modelling of measurements, Part 2
	15:00-17:00	Guest lecture
Day 3	Decision analyses	
	Time	Topics
	08.30-10:00	Introduction and fundamentals of Bayesian Prior, Pre-posterior and Posterior decision analysis, quantification of utilities
	10:30-12:00	Decision analysis types and Value of Information analyses, part 1: Extensive and Normal form, Decision rules
	13:00-14:30	Decision analysis types and Value of Information analyses, part 2
	15:00-17:00	Self-study and reading
Day 4	Supervised work on case studies	

Course evaluation

Course Diplomas are issued by COST TU1402 on the basis of (1) active course preparation, (2) active course participation and (3) a positive evaluation of the provided case study after the training school. 2.5 ECTS points will be awarded for the course.

Literature for preparation

- [1] Raiffa H, Schlaifer R. Applied statistical decision theory. Wiley classics library, Originally published: Harvard University, 1961. Republished: Wiley (2000)
- [2] Benjamin JR, Cornell CA. Probability, Statistics and Decision for Civil Engineers: McGraw-Hill New York; 1970.
- [3] Faber MH. Statistics and Probability Theory in Pursuit of Engineering Decision Support: Springer; 2012. ISBN 978-94-007-4055-6



How to get to Villa La Collina (Cadenabbia)

Public transports

There are three airports in Milan: **Malpensa, Linate, Orio al Serio**. A further option could be Lugano airport in Switzerland.

From **MALPENSA AIRPORT** (approximately 2h30)

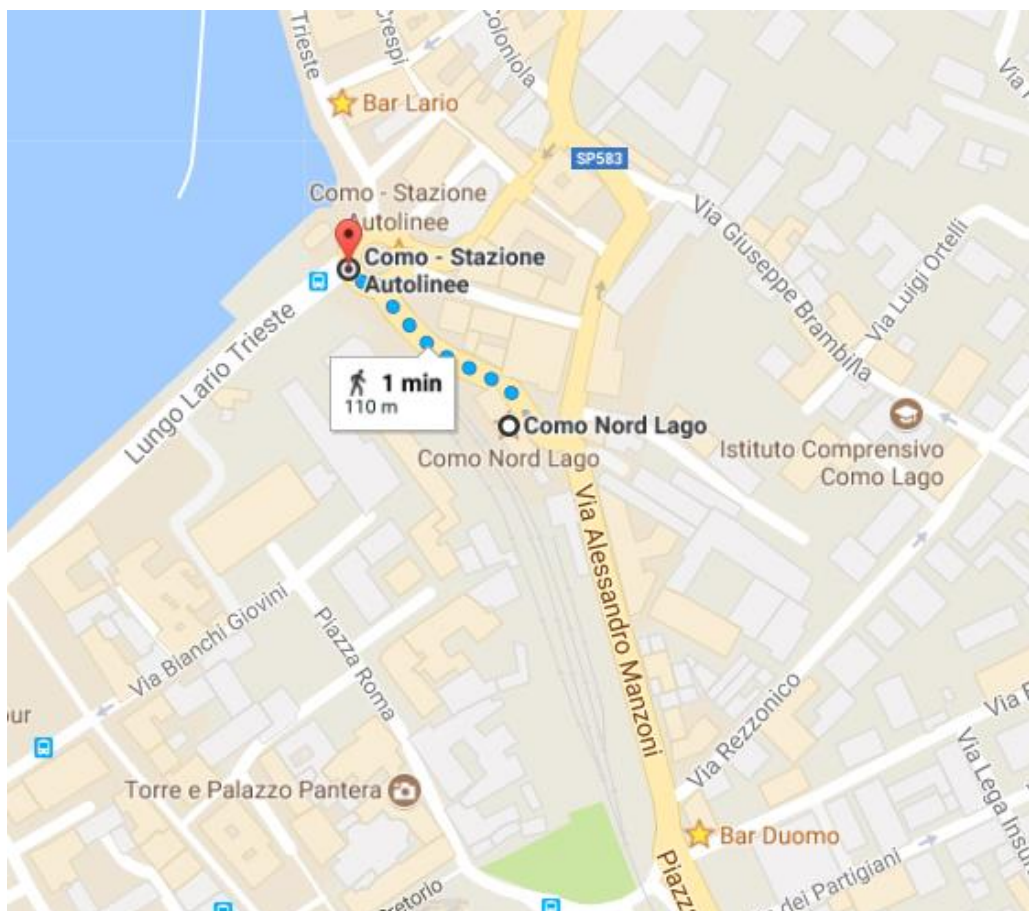
You can take the train “Malpensa Express” in direction of Milan (both directions Milano Cadorna and Milano Centrale are ok and both trains stop at Terminal 1 and 2) and change in **Saronno** for the regional train toward **Como Nord Lago**.

The full ticket from Malpensa to Como Lago Nord costs €21,80. Timetable and purchase of the tickets available at the airport or on line at <http://www.trenitalia.com/>.

From Como Stazione autolinee (100m from **Como Nord Lago** train station, see Map 1) to **Cadenabbia** take the bus ASF Autolinee, line **C10** direction Menaggio-Colico (it takes about 50 minutes).

Check <http://www.sptlinea.it/content/en/home> for the timetable.

The ticket can be purchased at Bar Lario (closed on Monday) in Lungo Lario Trieste or at Bar Duomo (closed on Sunday) in Piazza del Popolo 2 (see Map 1).



Map 1

For the way back in Cadenabbia the ticket can be purchased at the shop ‘Supermarket’ in via Roma 6.

The bus stop in Cadenabbia is “Cadenabbia -Majolica”



Follow the Map 2 to reach Villa La Collina from the bus stop



Map 2



From **LINATE AIRPORT** (approximately 3h)

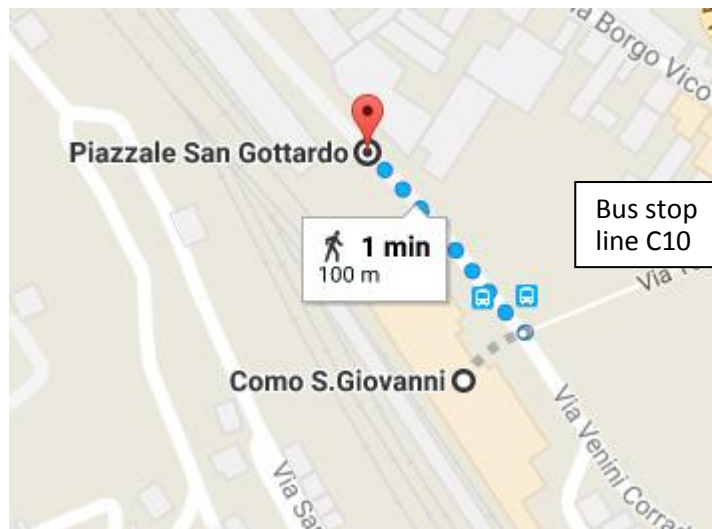
You can get any shuttle to **Milano Central Station** (tickets (5€) can be purchased on board) and then a train to **Como San Giovanni**. The ticket from Milano Central Station to Como San Giovanni costs 14€ (pay attention to take the fast train). Timetable and purchase of the tickets available at the station or on line at <http://www.trenitalia.com/>.

From **Como San Giovanni** to **Cadenabbia** there is a bus (but stop just in front of the station ASF Autolinee, line **C10** direction Menaggio-Colico (it takes about 50minutes).

Check <http://www.sptlinea.it/> for the timetable.

The ticket can be purchased at the newspaper kiosk (edicola) in Piazzale San Gottardo (see Map 3)
For the way back in Cadenabbia the ticket can be purchased at the Supermarket in via Roma 6.

Follow Map 2 to reach Villa La Collina from the bus stop.



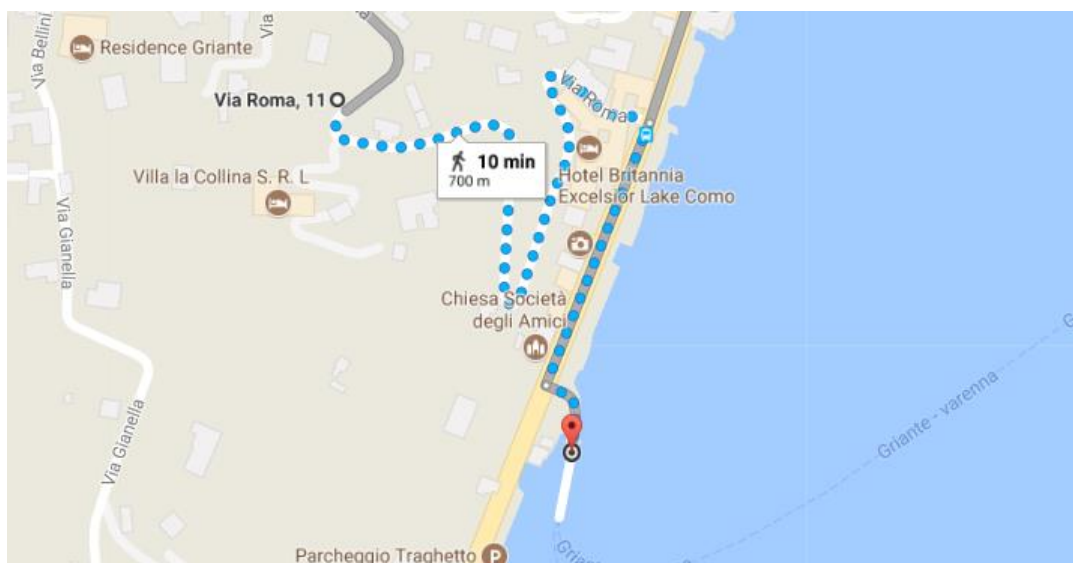
Map 3



From **ORIO AL SERIO AIRPORT** (approximately 3h30)

You have 2 options:

- 1) you can take a shuttle to **Milano Central Station** (<http://www.autostradale.it/> 5€, or <http://www.orioshuttle.com/>, 4€) and then follow the instructions reported for arrival to Linate Airport. The ticket can be purchased at the airport or on the websites.
- 2) You can go take the ATB Bus 1 to **Bergamo Station** (<https://www.atb.bergamo.it/it/viaggia-con-noi/turismo-a-bergamo/airport-bus>) and then a train to **Varenna** (here the timetable: <http://www.trenitalia.com/>). The ticket costs 5.5€ and can be purchased at the station or on line. **From Varenna** a ferry boat goes to **Cadenabbia** (30-45 min depending on the time of departure). Check <http://www.navigazionelaghi.it/eng/> for the timetable. Follow Map 4 to reach Villa La collina from the ferryboat port.

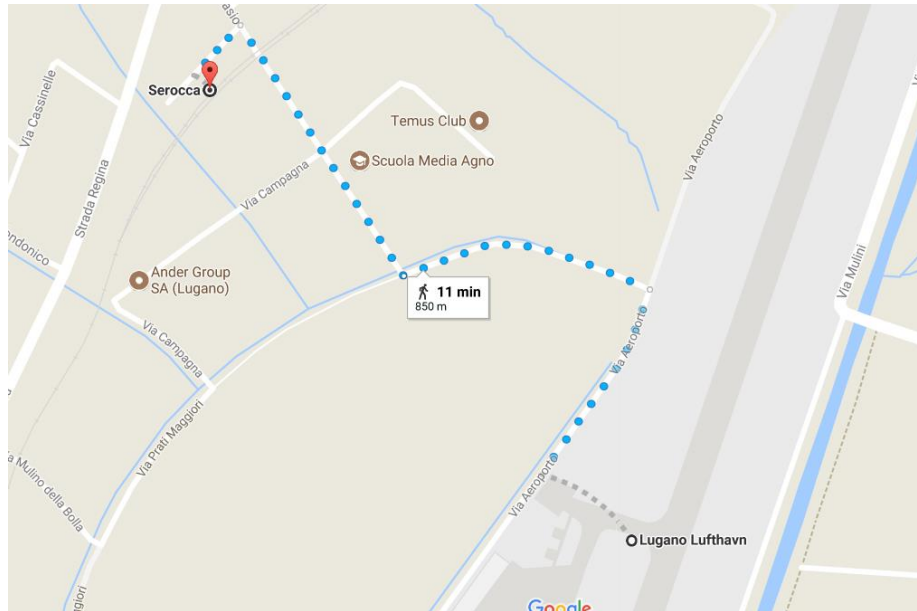


Map 4



From **LUGANO AIRPORT** (CH) (approximately 3h).

You can take the train at **Serocca station** (11 minutes by foot from the airport) or the shuttle bus to the Railway Station in **Lugano**. Check price and timetable here for the train <http://flpsa.ch/> and here for the shuttle: <http://www.lugano-airport.ch/en/facilities/taxi-shuttle> and <http://www.shuttle-bus.com/>.



From **Lugano Station** you can take the train to **Como San Giovanni**. Check ticket and timetable here: <https://www.sbb.ch/en/home.html>.

From **Como San Giovanni** to **Cadenabbia** follow the instructions reported for arrivals to Linate airport.

Taxi

From Malpensa and Linate to Cadenabbia by taxi it takes around 1.30 hours (approximately 130€)
From Orio al Serio it takes about 1h (approximately 90€) to Varenna where you have to take the boat to Cadenabbia.

Shuttle

If there is a sufficient number of interested participants, we can try to organize a shuttle from the airports or from Milan Central Station (easily reachable from all the airports) to Villa La Collina. Inform Maria Pina Limongelli if you are interested.



Accommodation

Villa La Collina ***

<http://www.kas.de/villalacollina/en/>

17 rooms have been reserved and will be available for reservation up to September 15.

The price of a room for the COST event is:

83€/night breakfast included for 1 persons

106€/night breakfast included for 2 persons.

To book send an email to: cadenabbia@villalacollina.it using the subject **COST TU1402**.

Booking has to be confirmed through a bank transfer of one night rate to the account:

Banca Popolare di Lecco – Deutsche Bank
IBAN: IT 65 0 03104 51520 000000018821
Agency in Menaggio BIC: DEUTITM 1023
Piazza Garibaldi, 17
I – 22017 Menaggio (Como)

Cancellation free up to October 20. Later cancellations or no show will be charged one night room rate.

Hotel Britannia Excelsior *** (5 minutes walk from Villa La Collina).

<http://www.hotelbritanniacadenabbia.com/>.

Please consider that in November most of the hotels in Cadenabbia are closed so early booking is warmly suggested.