Andrea Franchini

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About me

I am a postdoctoral researcher in structural engineering at Ghent University, focusing on the analysis and design of structures exposed to single and multiple hazards, as well as on optimal experimental design. My research addresses trade-offs between fire and seismic safety, sustainability, and resilience. I employ reliability- and risk-based methods to handle uncertainties in hazard-induced consequences, and I use optimisation techniques to manage multiple design criteria and identify solutions beyond conventional practice. I am committed to inspiring students and fostering a diverse, inclusive, and empowering learning environment, where they develop creativity, competence, and socially responsible skills to tackle complex engineering challenges.

Education

PhD in Structural Engineering *Feb 2020 – July 2024*
University College London, London, UK
Thesis: Consequence-oriented Fire intensity Optimisation: methodology development and application to bridges. Supervised by Prof Carmine Galasso and Prof Jose L. Torero.

Visiting Research Student *Nov 2023 – Feb 2024*
Princeton University, Princeton, NJ
Fire performance of steel girder bridges with low-frequency sinusoidal web. Supervised by Prof Maria E. Moreyra Garlock.

Qualified Civil Engineer *Oct 2020*
University of Parma, Parma, Italy
State Exam for Qualification to the Profession of Engineer. Sec A, Civil and Environmental Sector.

Double MSc in Structural Engineering *Sep 2015 – Oct 2018*
University of Trento, Trento, Italy - Tongji University, Shanghai, China
Thesis: Analysis and design of periodic foundations for the seismic protection of storage tanks. Supervised by Prof Oreste S. Bursi (Trento) and Prof Feifei Sun (Tongji).
Score: 107/110 (Italy); 92.4/100, GPA: 4.88/5 (China)

BSc in Civil Engineering *Sep 2012 – Sep 2015*
University of Trento, Trento, Italy
Score: 108/110

Employment History

Postdoctoral researcher *Aug 2024 – now*
Ghent University, Ghent, BE
Working on the ERC Grant project "Adaptive Fire Testing (AFireTest): A New Foundation Stone for Fire Safety." I contribute to and help coordinate two of the four work packages in the project. My role includes: (i) developing probabilistic methods to quantify and maximise the utility of fire tests prior to execution; (ii) integrating these methods into a new framework to demonstrate fire safety; (iii) co-supervising two PhD students. PI: Prof Ruben Van Coile

Research assistant *Nov 2018 – Nov 2019*
University of Trento, Trento, Italy
Conception of dissipation devices for seismic protection of civil systems based on metamaterial concepts for vertical seismic actions. Supervised by Prof Oreste S. Bursi.

Structural Engineer *Nov 2018 – Feb 2019*
Studio Tecnico Turrina, Verona, Italy
Structural design of residential and industrial buildings, site inspections, and project documentation management.

Structural Engineering Internship *June – Oct 2018*
ECADI, Shanghai, China
Structural design and seismic analysis of buildings. Main achievements: (i) Matlab code for the design of steel-concrete composite beams and tables for preliminary design; (ii) static analysis of a Chinese fan-shaped stair for Shanghai Opera (ANSYS); (iii) non-linear time history analysis of a school building with base isolation (ETABS).

Teaching Record

Analysis of Structures *AY 2024-25 – now*
Ghent University, Ghent, Belgium
Lecturer in Charge. This course is part of the International MSc in Fire Safety Engineering (IMFSE). I teach the fundamental principles of structural analysis at ambient design temperatures, covering both statically determinate and indeterminate structures. Furthermore, I introduce students to structural reliability and finite element analysis.

PhD and MSc student supervision *AY 2024-25 – now*
Ghent University, Ghent, Belgium
I co-supervise two PhD students working on the AFireTest project and two MSc students conducting research in forensic fire engineering and glazing testing at elevated temperatures. A third PhD student under my co-supervision is expected to begin in May 2026.

Integrated Design Projects *AY 2021-22 and 22-23*
University College London, London, UK
Teaching assistant (course led by Dr Augustin Guibaud). The students work in teams to design a major civil engineering project, with support from industrial partners and academics. Main duties: (i) supervise groups working on bridge engineering projects; (ii) gather and provide feedback about client and senior partner meetings; (iii) mark coursework.

Reliability, Risk and Resilience Modelling *AY 2021-22 and 22-23*
IUSS Pavia, Pavia, Italy.
Teaching assistant (course led by Prof Carmine Galasso). I delivered teaching sessions on simulation methods (e.g. Monte Carlo Sampling) to calculate the failure probability of structural systems.

Materials, Mechanics and Making *AY 2020-21, 21-22, and 22-23*
University College London, London, UK.
Teaching assistant (course led by Dr Yasemin Aktas). Main duties: (i) deliver tutorials on material mechanics; (ii) mark coursework; (iii) assist in the scenario week, during which students design, construct, and test a load-bearing system.

Structural Analysis and Design *March 2023*
University College London, London, UK.
Teaching assistant (course led by Dr Philippe Duffour). I conducted structural laboratory demonstrations focused on indeterminate structures.

MSc Thesis supervision *March – Sep 2022*
University of Greenwich, London, UK.
I supervised four MSc students on the following projects: (i) Selection of optimal structural system for cable-supported bridges to minimise cost and environmental impact; (ii) Effect of traffic loads on the seismic response of structural components in bridges; (iii) Seismic vibration control of cable-stayed bridges using locally resonant periodic devices (co-supervised with Dr Xiao Lei, Tongji University); (iv) Benefits of negative stiffness devices on vertical attenuation capacity of metafoundations (co-supervised with Dr Xiao Lei).

Vibrations, Acoustics & Control *Oct – Nov 2020*

University College London, London, UK.
Teaching assistant (course led by Prof Paul Fromme). I delivered tutorials on structural dynamics for single-, multiple-degree-of-freedom, and continuous systems.

Research Grants

Awarded

Turing Scheme Mobility Grant *2024*
UK Government
Fire safety design of bridges: learning from the I-95 bridge collapse.
Funding to support my research stay at Princeton University, USA.
Funding amount: GBP 1,645 (≈ EUR 1,960)

Student Research Grant *2022*
Society of Fire Protection Engineers (SFPE)
A novel risk-based fire design method for sustainable structures.
Funding amount: USD 5,000 (≈ EUR 4,600)

Maurice Franses Memorial Scholarship *2020*
University College London - The Amar-Franses & Foster-Jenkins Trust
Multi-hazard probabilistic design of long-span bridges.
Doctoral scholarship awarded based on an independently developed research proposal.
Funding amount: Approx. GBP 100,000 (≈ EUR 119,000)

Submitted (Not Awarded)

FWO Junior Research Project – Fundamental Research *2025*
Research Foundation of Flanders (FWO)
Multi-Hazard Life-Cycle Performance Modelling of Deteriorating Reinforced Concrete Bridges Exposed to Fire and Earthquake.
Role: co-PI (with Prof Ruben Van Coile, Ghent University)
Requested funding: EUR 580,000

Talks

15. *Optimising the inherent fire capacity of structures by rethinking the design workflow*. SFPE Tennessee Valley Chapter. Knoxville, TN (online presentation). Feb 5, 2026.
14. *Integrating fire safety into bridge design is essential for resilient infrastructure*. COWI, London, UK. Nov 24, 2025.
13. *Episode 228: Quantifying the expected utility of fire tests with Andrea Franchini*. Fire Science Show Podcast. Link.
12. *Consequence-oriented fire intensity optimisation for structural design*. Trigon Fire, London, UK. May 29, 2024.
11. *Optimizing the inherent fire capacity of structures by rethinking the design workflow*. Society of Fire Protection Engineers (SFPE) Webinar. April 9, 2024.
10. *Optimizing the inherent fire capacity of structures*. Princeton University CEE Seminar. Princeton, NJ. Feb 21, 2024.
9. *Exploiting OpenSees for fire in structural optimisation*. Workshop: recent research results using OpenSees. University College London, London, UK. Jan 11, 2024.

8. *Consequence-oriented fire intensity optimisation for structural design*. Hydrock, London, UK. Dec 5, 2023.

7. *Assessing the true performance of structures in fire*. AXA XL, London, UK. Nov 9, 2023.

6. *Consequence-oriented fire intensity optimisation for structural design under uncertainty*. Structures in fire forum. The Institution of Structural Engineers (IStructE). London, UK. July 29, 2023.

5. *Structures in fire or fires in structures? Assessing the true performance of structures in fire*. Verisk, London, UK. July 25, 2023.

4. *Consequence-oriented fire intensity optimisation for structural design*. AKTII, London, UK. May 16, 2023.

3. *A consequence-oriented approach to fire safety design under uncertainty*. Arup, London and UK offices, UK. April 4, 2023.

2. *Maximum Allowable Consequence approach to the fire safety design of bridges*. AKTII, London, UK. March 6, 2023.

1. *Probabilistic optimization of seismically excited cable-stayed bridges*. EPICentre Seminars. University College London, London, UK. March 24, 2021.

Honors and Awards

- Student Recognition Award from the International Civil Engineering Risk and Reliability Association (CERRA). ICASP14 conference, Dublin, Ireland. July 2023.
- 1st place at the 3-minute Thesis (3MT) Competition. UCL Department of Civil, Environmental and Geomatic Engineering. London. April 2023.
- Best Student Presentation Award and Student Travel Grant. The 12th International Conference on Structures in Fire (SiF2022). Hong Kong. Dec 2022.
- Academic Rep of the Year. UCL Faculty of Engineering Sciences. London. July 2022.
- Best PhD Student Research Pitch. UCL Department of Civil, Environmental and Geomatic Engineering. London. Oct 2022.
- Research assistant grant. Conception of dissipation devices for seismic protection of civil systems based on metamaterial concepts for vertical seismic actions. University of Trento, Trento, Italy. Nov 2018.
- MSc Career Award Prize. University of Trento, Trento, Italy. Oct 2018.
- Double MSc Degree Scholarship. University of Trento, Trento, Italy. Nov 2016.
- BSc Career Award Prize. University of Trento, Trento, Italy. Oct 2015.

Public and Professional Service

Peer reviewer *Jan 2023 – now*

I have peer-reviewed papers for the following journals: Fire Safety Journal, Fire Technology, Soil Dynamics and Earthquake Engineering, International Journal of Disaster Risk Reduction, ASCE Journal of Structural Engineering, Archives of Computational Methods in Engineering.

ASCE SEI Committee Member *Jan 2026 – now*

Task Group 3: Risk Assessment of Structural Infrastructure Facilities

I joined the committee to support initiatives on multi-hazard structural optimisation, Bayesian methods, and risk-based optimal experimental design.

Conference sessions *Jun 2025*

Co-organised and chaired the following session at the 14th International Conference on Structural Safety and Reliability (ICOSSAR'25, June 1-6, 2025, Los Angeles, CA): "TS5 - MS 53 Safety, risk and resilience of fire-exposed structures and communities." A. Franchini, R. Van Coile, N. Elhami-Khorasani, and T. Gernay.

Engineering Sciences Faculty Rep (Research students) *Nov 2021 – Nov 2023*

University College London, London, UK.

Main achievements and contributions: (i) conceptualise, organise, and host the "UCL Engineering PhD Students Research Festival" (July 2021 and 2022) and the "UCL Engineering PhD Students Business Festival - Entrepreneurship competition" (July 2022); (ii) organise two joint events for PhD students in the Engineering Sciences Faculty and UCL Bartlett School of Architecture; (iii) collect concerns about PGTA payment and prepare a report; (iv) member of a working group for developing a new system to manage studentship payments for doctoral researchers; (v) panellist in welcoming events for PhD students; (vi) discuss, promote and support diversity, equity, and inclusion policies; (vii) participate in UCL Academic Board meetings.

Postgraduate Champion *Nov 2020 – Oct 2021*

Institution of Civil Engineers (ICE), London, UK.

I was actively involved in the initiatives of the ICE London Graduates and Students Committee. Main role: (i) represent the views of postgraduate students; (ii) encourage their broader participation in the committee; (iii) for research students, support an informed choice of activities that contribute to both the Researcher Development Framework's and the ICE CEng Member's attributes.

Volunteer *Jul – Sep 2020*

Nuffield Research Placements, London, UK.

A-level student tutor for a research project: "Comparing early- and recently-built cable-stayed bridges."

Volunteer *Jul 2020*

I'm an Engineer, London, UK.

I'm An Engineer - Stay At Home! Live chats with primary school students (online activity).

Publications

Journal Papers (published)

8. Franchini, A., Morrisset, D., Emberley, R. and Van Coile, R. 2026. *On the uncertainty of flashover correlations and its effect on risk assessment*. Fire Safety Journal, 104759.

7. Franchini, A., Van Coile R. 2025. *Quantifying the expected utility of fire tests and experiments before execution*. Fire Safety Journal, 104538.

6. Franchini, A., Barake, B., Galasso, C., Garlock, M.E., Mulligan, J., Quiel, S. and Torero, J.L. 2024. *Integrating fire safety into bridge design is essential for resilient infrastructure*. Nature Communications, 15(1), 6629.

5. Franchini, A., Galasso, C. and Torero, J.L, 2024. *Probabilistic performance-based fire design of structures: a hazard-focused and consequence-oriented perspective.* Fire Technology, 60(4), 2845-2873.

4. Franchini, A., Galasso, C. and Torero, J.L, 2024. *Consequence-oriented fire intensity optimization for structural design under uncertainty.* ASCE Journal of Structural Engineering, 150(4).

3. Franchini, A., Galasso, C. and Torero, J.L, 2023. *Optimising the inherent fire capacity of structures.* Fire Safety Journal, 141. Presented by the first author at the 14th International Symposium on Fire Safety Science (IAFSS 2023), October 23-27, 2023, Tsukuba, Japan.

2. Franchini, A., Sebastian, W. and D'Ayala, D., 2022. *Surrogate-based fragility analysis and probabilistic optimisation of cable-stayed bridges subject to seismic loads.* Engineering Structures, 256.

1. Franchini, A., Bursi, O.S., Basone, F. and Sun, F., 2020. *Finite locally resonant metafoundations for the protection of slender storage tanks against vertical ground accelerations.* Smart Materials and Structures, 29(5).

Journal Papers (under review)

2. Korsten, R., Franchini, A., and Van Coile, R. *The Relevance of Law and Economics for Fire Safety*. Submitted to Fire Technology, 2025.

1. Peng, M., Franchini, A., Jovanović, B., and Van Coile, R. *Incorporating invalid test results in glass fracture load determination*. Submitted to Glass Structures & Engineering, 2025.

Journal Papers (in preparation)

4. Franchini, A., Contini, L., Heine, T., Van Coile, R. *Modelling and testing fire rescue service vehicle speed in the Large Hadron Collider*. In preparation for submission to *Safety Science*.

3. Franchini, A., Pelekis, I., Mohammed, A.S., Galasso, C., Pavic, A., Margnelli, A. *Probabilistic perception and cognitive effect analysis for human-induced floor vibration*. In preparation for submission to *Journal of Building Engineering*.

2. Peng, M., Franchini, A., Jovanović, B., Van Coile, R. *Time-dependent model uncertainty quantification for thermo-mechanical analysis*. In preparation for submission to *Structural Safety*.

1. Thienpont, T., Franchini, A., Van Coile, R. *Assessing the fire performance of shallow tunnels exposed to fire*. In preparation for submission to *Tunnelling and Underground Space Technology*.

Conference Papers

12. Van Coile, R., Franchini, A. *Which test is the best? Choosing the fire test that maximizes the information gain.* 5th European Symposium on Fire Safety Science, ESFSS 2025, September 3-5, 2025, Ljubljana, Slovenia. Journal of Physics: Conference Series, vol. 3121, no. 1, p. 012037. IOP Publishing, 2025.

11. Peng, M., Franchini, A., Jovanović, B., and Van Coile, R. *Exploiting invalid test results for assessing the distribution of glazing fracture strength.* 21st International Probabilistic Workshop, IPW 2025, September 10-12, 2025, Rostock, Germany. ce/papers, 8(3-4), 144-151.

10. Yarmohammadian, R., Jovanović, B., Franchini, A., and Van Coile, R. *Physics-informed surrogate modelling for the temperature of protected steel elements in fire.* Interflam 2025, June 30-July 2, 2025, Royal Holloway, University of London, UK.

9. Franchini, A., Van Coile R. *Guiding Adaptive Fire Testing through Expected Information Gain.* The 14th International Conference on Structural Safety and Reliability, ICOSSAR 2025, June 2-5, 2025, University of Southern California, Los Angeles, CA, USA.

8. Peng, M., Symoens, E., Franchini, A., Yarmohammadian, R., and Van Coile, R. *In-thickness absorption in soda-lime-silica glazing: experimental studies and 1D heat transfer models.* The 4th International Conference on Structural Safety Under Fire and Blast Loading, CONFAB 2024, September 9-10, 2024, London, UK.

7. Franchini, A. and Galasso, C., 2023. *Seismic optimisation of cable-stayed bridges based on expected annual loss and embodied carbon.* The SECED 2023 Conference, September 14-15, 2023, Cambridge, UK.

6. Franchini, A., Galasso, C. and Torero, J.L., 2023. *Addressing the pitfalls of risk-based methods for fire safety design of structures.* The 14th International Conference on Application of Statistics and Probability in Civil Engineering, ICASP 14, July 9-13, 2023, Trinity College Dublin, Dublin, Ireland.

5. Franchini, A., Galasso, C. and Torero, J.L., 2022. *Maximum allowable consequence approach to fire safety design of bridges.* The 12th International Conference on Structures in Fire, SiF 2022, Nov 30 - Dec 2, 2022, The Hong Kong Polytechnic University, Kowloon, Hong Kong.

4. Franchini, A., De Poli, M. and Galasso, C., 2022. *Competing seismic-safety and sustainability goals in cable-stayed bridge optimisation.* 12th National Conference on Earthquake Engineering, 12 NCEE, June 27-July 1, 2022, Salt Lake City, Utah, USA.

3. Franchini, A., Sebastian, W. and D'Ayala, D., 2021. *Parameterized seismic fragility functions for cable-stayed bridges.* 13th International Conference on Structural Safety & Reliability, ICOSSAR 2021-2022, September 13-17, 2021, Tongji University, Shanghai, China (held online).

2. Franchini, A., Bursi, O.S., Xiao, L., Basone, F. and Sun, F., 2020. *Periodic metafoundations for the protection of storage tanks against vertical ground accelerations.* 17th World Conference on Earthquake Engineering, 17 WCEE, September 13-18, 2020, Sendai, Japan (held online).

1. Franchini, A., Sun, F. and Bursi, O.S., 2018. *Design of a Periodic Foundation for the Seismic Protection of a Slender Storage Tank Against Vertical Ground Accelerations.* 4th Huixian International Forum on Earthquake Engineering for Young Researchers. Aug 21-22, 2018, Shanghai, China.

Referees

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