UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO II

DIPARTIMENTO DI STRUTTURE PER L'INGEGNERIA E L'ARCHITETTURA
CORSO DI DOTTORATO DI RICERCA IN
INGEGNERIA STRUTTURALE GEOTECNICA E RISCHIO SISMICO

XXXVIII CICLO

Il sottoscritto prof. __ANTONIO FORMISANO_____

(PO □ PA ■ RU □ RTD □) afferente al Dipartimento di ___

STRUTTURE PER L'INGEGNERIA E L'ARCHITETTURA_____

S.S.D. (*indicare codice e nome per esteso*___ICAR/09 TECNICA DELLE COSTRUZIONI)

CHIEDE

di essere inserito nell'elenco dei tutor per il XXXVIII ciclo.

1. Curriculum del proponente (max 500 parole)
Antonio Formisano is Associate Professor of Structural Design at the Department of Structures for Engineering and Architecture of the University of Naples "Federico II". Qualified as Full Professor in 2021, he is lecturer in courses on metal structures and vulnerability and seismic retrofitting of existing buildings within the framework of the International Masters ETeC, Design of Steel Structures in Smart Cities, SUSCOS, ELARCH, ArINT and DYCLAM. His research is mainly focused on the following topics: analysis of steel and aluminium alloy structural systems and connections; seismic vulnerability analysis of masonry buildings, with particular reference to building aggregates in historic centres, and reinforced concrete ones; vulnerability and seismic risk of historic centres; seismic consolidation of existing structures by systems based on the use of metal materials; seismic analysis of cold-formed thin walled structures; robustness of steel structures; composite materials made of natural fibres, life cycle assessment and energy requalification of buildings. He is the author of more than 450 publications published in national and international journals and books, as well as on national and international conference proceedings, where he participated as speaker and chairman. His records on Scopus are as follows: Documents 220, Citations: 2873, H index: 32 (updated on 28/07/22). He was part of the working group that delivered the technical document CNR-DT 208/2011 on the design of aluminium alloy structures. He was a consultant of UNI for the translation of EuroCode 3 Part 1.8 on the design

of steel joints. Currently he is a member of the project teams for the development of the new version of Eurocode 9 "Design of aluminium alloy structures" He was member of the editorial and scientific committee of numerous national and international conferences and congresses. He participated and is participating as a member and coordinator of numerous national and international research projects. He is a member of the editorial board and reviewer of numerous national and international journals. He held lectures and seminars at several Universities and National and International Research Centres, as well as training courses at Universities and Professional Orders on European Community marking, design of steel and aluminium structures and connections, seismic vulnerability and retrofitting of existing buildings, study and experimentation on new eco-friendly building materials. He received awards in the fields of Structural Engineering and Green buildings. In particular, he was featured among the World's Top 2% Scientists 2021, as published by Stanford University on Plos Biology.

2. Dottorandi dei quali il proponente è stato tutor nell'ultimo triennio	
n. __2___	*specificare tipologia di borsa: ateneo, pon, por, ecc.* *ATENEO + PON DM1061*_____

3. Titolo della ricerca proposta
Structural health monitoring, numerical analysis and retrofit of steel bridges

4. Area Tematica
Ingegneria Geotecnica □

Ingegneria Strutturale ■
Rischio Sismico □

5. Sintesi del progetto di ricerca (max 500 parole. Stato dell'arte, breve programma previsto per le attività e obiettivi)
The state of the art regarding an adequate level of knowledge and analysis of metal alloy bridges presents guidelines and methodologies of various types that are not always applicable to particular case studies. The activities planned for this Ph.D. course concern, firstly, the application of various methodologies to achieve a complete knowledge degree of the mechanical features of steel bridges. Diagnostic tests on metal alloy materials can be classified as destructive, weakly destructive and non-destructive. With reference to steel buildings, non-destructive tests are not largely diffused as for reinforced concrete ones, but they could be very useful to limit the extraction of members from the structures for tensile tests and the consequent repairing interventions. In the case of metal bridges, maintenance interventions involve the suspension of transit for structures that play a strategic role. Therefore, the use of non-invasive investigations is of great importance. For these reasons, the Ph.D. activities should be oriented towards the use of non-destructive diagnostic instrumentation, such as Leeb hardness tests, to obtain mechanical, physical and chemical characterization of materials. Later on, the evaluations carried out with diagnostic instruments must consequently be associated with an evaluation of the corrosion state of steel members both in terms of depth loss and different deterioration typologies. So, the planned activities should be also aimed at characterizing and predicting the damage deriving from corrosion of metal alloys. To date, very few studies have been conducted on the prediction of corrosive actions extended over a long time. It is extremely important to quantify this type of damage and identify its development scenarios to monitor the damage status and plan proper maintenance. Finally, the activities will turn towards evaluating structural robustness and useful life of steel bridges through non-linear numerical analyses. This type of analysis is becoming increasingly indispensable in evaluating the useful life of the bridge structure, also through the quantification of its robustness level, intended as the ability to withstand either unforeseen actions or loads greater than design ones. Through the aid of static and dynamic analyses in the non-linear field, as well as with the assessments previously performed about corrosion state and

mechanical properties, a complete state of knowledge about the steel bridge structures is done to evaluate their safety level and, consequently, to plan appropriate retrofit interventions.

6. Pubblicazioni sul tema di ricerca

- ☐ Formisano, A., Chiumiento, G., Di Lorenzo, G. (2018). Leeb hardness experimental tests on carpentry steels: Surface treatment effect and empirical correlation with strength. AIP Conference Proceedings, 1978, art. no. 450004.DOI: 10.1063/1.5044058.
- ☐ Formisano, A., Davino, A. (2021). Hardness vs Strength for Structural Steels: First Results from Experimental Tests. Lecture Notes in Civil Engineering, 128, pp. 227-237. DOI: 10.1007/978-3-030-64908-1_21.
- ☐ Formisano, A., Felitti, M., Oliveto, F., Mendicino, L. (2021). Influence of different degradation mechanisms on structural robustness: the case study of a reinforced concrete arch bridge. CACRCS Days 2021, 30 November – 3 December 2021.
- ☐ Rizzo, F., Di Lorenzo, G., Formisano, A., Landolfo, R. (2019). Time-Dependent Corrosion Wastage Model for Wrought Iron Structures. Journal of Materials in Civil Engineering, 31 (8), art. no. 4019165. DOI: 10.1061/(ASCE)MT.1943-5533.0002710.
- ☐ Saracco, U., Felitti, M., Oliveto, F., Alvaro, M. R., Formisano, A. (2022). Robustness evaluation of a steel bridge in the district of Potenza (Italy). XIX ANIDIS Conference, Seismic Engineering in Italy, Turin, 11-15 September 2022.

7. Progetti di ricerca finanziati in cui l'attività si inserisce

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8. Fondi disponibili per eventuali assegni, borse di ricerca, ecc., per acquisto eventuale di attrezzature, missioni

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9. Informazioni relative ad un periodo di ricerca all'estero (minimo tre mesi) previsto per il dottorando (*indicare Università/ente di ricerca e docente/ricercatore di riferimento*) (max 300 parole)
A minimum of three months will be spent by the PhD student at the University of Cergy-Pontoise (France) under the tutorage of Professor George Wardeh, who is working in the field of metal materials. A further research period of at least three months could be spent at the University of Timisoara (Timisoara) under the guidance of Prof. Marius Mosoarca, who collaborated since many years with me in the field of seismic assessment of structures.

10. Eventuali collaborazioni con imprese/aziende sul tema di ricerca (max 300 parole)
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Napoli,_28/07/2022_____ FIRMA

Il presente modulo va compilato in ogni sua parte ed inviato all'indirizzo di posta elettronica phd.dist@unina.it entro e non oltre **mercoledì 20/07/2022**