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| Titolo del corso (in Inglese) | Green Federated Learning |
| Sottotitolo (in Inglese) | Federated Learning |
| Referente proponente (un membro del Collegio dei Docenti) | Prof. Gianluigi Greco, Prof. Giorgio Terracina |
| Docente/i (Il corso può essere tenuto da uno o più docenti, interni – ivi incluso il referente - oppure esterni, purché di elevata qualificazione.) | Dr. Dipanwita Thakur |
| Abstract generico del Corso (in Inglese) | Green AI is an emerging and essential area of research that takes into account the carbon footprint as a key evaluation criterion for AI, alongside accuracy, convergence speed, and other metrics. Inline with the FAIR project within University of Calabria, Green-Aware AI, this course will help the researchers to explore federated learning for Green-Aware AI solutions and systems. |
| Abstract specifico del Corso (in Inglese) | <p>The rapid advancement of AI is being driven by increasingly large and computationally intensive machine learning models and datasets. As a result, the amount of computing power used to train state-of-the-art models is growing exponentially, doubling approximately every 10 months between 2015 and 2022. This trend is leading to a significant carbon footprint. Federated Learning (FL) is a collaborative machine learning technique that trains a centralized model using data from decentralized entities. However, FL can also be resource-intensive and contribute to a substantial carbon footprint, especially when deployed at scale. Unlike centralized AI, which can access renewable energy at strategically located data centers, cross-device FL may utilize hundreds of millions of globally distributed end-user devices with diverse energy sources.</p> <p>This course introduces students to the fundamentals and recent advances in federated learning, with a focus on reducing communication costs, improving computational efficiency, and enhancing security. Federated learning is a distributed machine learning paradigm that enables model training on a large body of decentralized data. Its goal is to make full use of data across organizations or devices while meeting regulatory, privacy, and security requirements. Additionally, this course introduces green federated learning, which is a new paradigm for researchers interested in working on energy-efficient AI systems or solutions.</p> |
| Elenco analitico degli argomenti (in Inglese) | <ul style="list-style-type: none"> • Introduction: Federated Learning Vs. Green Federated Learning • Traditional federated Learning Algorithms • Challenges in Green Federated Learning • Algorithms and methods in Green FL • Methods to address the challenges of green federated learning • Optimization methods in Green federated learning |

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| <p>Ore di didattica frontale prevista</p> <p><i>(Per uniformità e al fine di agevolare l'organizzazione, risulta preferibile – sebbene non è da intendersi come vincolo – organizzare il corso su 12 ore complessive, articolate in 4/6 incontri.)</i></p> | <p>12 ore in 4 incontri, da 3 ore ciascuno</p> |
| <p>Prova di verifica</p> <p><i>(E' obbligatorio prevedere una prova finale. Essa può essere tuttavia articolata con flessibilità: progetti, orale, discussione di lavori scientifici, ...)</i></p> | <p>Written and/or oral Examination</p> |
| <p>Periodo di erogazione</p> <p><i>(Riportare preferenza sul mese in cui deve essere erogato il corso)</i></p> | <p>November</p> |