UNIVERSIDADE FEDERAL DE OURO PRETO
PRÓ-REITORIA DE GRADUAÇÃO
PROGRAMA DE DISCIPLINA

Name of the course in Portuguese: Cidades Inteligentes: Sustentabilidade, Tecnologia e Sociedade Name of the course in English: Smart Cities: Sustainability, Technology, and Society		Code: xxxxxx
Department's name and acronym: Department of Urban Engineering		Academic unit: Escola de Minas
Term load 90 hours	Theoretical load per week 4 hours/class	Practical load per week 2 hours/class

Course description:

The course explores the **interdisciplinary concept of Smart Cities**, addressing the **challenges and opportunities** that arise from **rapid urbanization**, **technological advancements**, and the need for **sustainable development**. It integrates key elements from engineering, urban planning, data science, and public policy to **foster innovative solutions** for urban environments. Topics include urban sustainability, digital infrastructure, Internet of Things (IoT), urban data management, citizen engagement, intelligent mobility, energy efficiency, and decentralized systems. **Practical activities aim to develop prototypes, tools, or models for smarter and more sustainable cities.**

Course Objectives:

- To **introduce** students to the core principles, technologies, and frameworks defining **Smart Cities**.
- To promote an **interdisciplinary understanding** of urban **sustainability**, **governance**, and **digital transformation**.
- To provide **hands-on experience** with tools and technologies, including **IoT** platforms, data analysis, and urban sensing systems.
- To encourage **critical thinking** regarding **equity**, **privacy**, and **resilience** in future urban developments.
- To enable students to **design practical solutions** for real urban challenges through collaborative projects.

Course content:

1. Introduction to Smart Cities
    a. Definition and Conceptualization;
    b. Historical Context;
    c. Urbanization and socio-environmental challenges;
2. Key Components of Smart Cities
    a. Technological Infrastructure;
    b. Domains of Application;
3. Governance and Policy
    a. Governance Frameworks;
    b. Policy Challenges;
    c. Digital inclusion and urban equity;
4. Smart City Development and Implementation
    a. Implementation Strategies;
    b. Case Studies;

5. Smart Mobility and Urban Logistics
    a. Intelligent transportation systems (ITS);
    b. Sustainable mobility models;
    c. Shared, autonomous, and electric transport;
6. Social and Ethical Implications
    a. Citizen Involvement;
    b. Ethical Considerations;
    c. Cybersecurity and privacy;
7. Sustainability and Future Prospects
    a. Sustainable development goals (SDGs);
    b. Circular economy, green infrastructure, energy and water management;
    c. Future Trends;
8. Urban Prototyping and Living Labs
    a. Participatory design and human-centered innovation;
    b. Case studies: national and international smart cities;
9. Capstone Project
    a. Development of a smart city solution prototype;
    b. Application of course knowledge to a real or hypothetical urban issue;
    c. Group presentation and report;

Basic bibliography:

BATTY, Michael. *The new science of cities*. Cambridge: MIT Press, 2013.

CARAGLIU, Andrea; DEL BO, Chiara; NIJKAMP, Peter. Smart cities in Europe. *Journal of Urban Technology*, v. 18, n. 2, p. 65–82, 2011.

GOTTMANN, Jean - Megalopolis: The Urbanized Northeastern Seaboard of the United States - Twentieth Century Fund, 1964, 720p. Available at: https://direct.mit.edu/books/oa-monograph/5083/MegalopolisThe-Urbanized-Northeastern-Seaboard-of. Accessed: Apr. 9, 2025.

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HARRISON, Colin; DONNELLY, Ian A. A theory of smart cities. In: *Proceedings of the 55th Annual Meeting of the International Society for the Systems Sciences*. Hull: ISSS, 2011.

MCARGH, Ian - Design with nature - American Museum of Natural History, 1969, Published for the American Museum of Natural History [by] the Natural History Press, 360p. Available at: https://archive.org/details/designwithnature00mcha. Accessed: Apr. 9, 2025.

NAM, Taewoo; PARDO, Theresa A. Conceptualizing smart city with dimensions of technology, people, and institutions. In: *Proceedings of the 12th Annual International Digital Government Research Conference*, 2011.

YIN, Chengzhi et al. A literature survey on smart cities. *Science China Information Sciences*, v. 58, p. 1–18, 2015. DOI: https://doi.org/10.1007/s11432-015-5397-4.

ZANELLA, Andrea et al. Internet of Things for Smart Cities. *IEEE Internet of Things Journal*, v. 1, n. 1, p. 22–32, 2014.

Complementary bibliography:

CAMERO, Alejandro; ALBA, Enrique. Smart City and information technology: a review. *Cities*, v. 93, p. 84–94, 2019. DOI: https://doi.org/10.1016/J.CITIES.2019.04.014.

CHOURABI, Hafedh et al. Understanding smart cities: an integrative framework. In: *Proceedings of the 45th Hawaii International Conference on System Sciences*. IEEE, 2012.

COHEN, Boyd. *The Smart Cities Wheel*. Available at: https://www.smartcitiesdive.com/ex/sustainablecitiescollective/smart-cities-wheel/216137/. Accessed: Apr. 9, 2025.

FERREIRA, Diogenes Viegas Mendes. Smart Cities: embarcando plataformas generalistas. 2017. Dissertation (Master's in Electrical Engineering) – Universidade Federal de Minas Gerais, Belo Horizonte, 2017.

GEHL, Jan. *Cities for people*. Washington, DC: Island Press, 2011.

IEEE. *IoT and Smart Cities Standards & White Papers*. Available at: https://smartcities.ieee.org/. Accessed: Apr. 9, 2025.

KITCHIN, Rob. *The data revolution: big data, open data, data infrastructures and their consequences*. London: SAGE, 2014.

KOMNINOS, Nicos. *Intelligent cities: innovation, knowledge systems and digital spaces*. London: Routledge, 2013.

SILVA, Carlos Nunes (ed.). *Citizen e-participation in urban governance: crowdsourcing and collaborative creativity*. Cham: Springer, 2020.

TOWNSEND, Anthony M. *Smart cities: big data, civic hackers, and the quest for a new utopia*. New York: W. W. Norton, 2013.

UNITED NATIONS – HABITAT. *World cities report*. Nairobi: UN-Habitat, 2022.