EMENTAS E PROGRAMAS DAS DISCIPLINAS DE TÓPICOS
PÓS-GRADUAÇÃO EM ENGENHARIA MECÂNICA

2º semestre de 2025

Férias de inverno

- **Course syllabus**

Topics
1. Introduction on Railways and Train/Track Dynamics
2. EN14363 standard
3. Design of Railway Passengers Cars
4. Longitudinal Train Dynamics
5. Passenger Cars Dynamics
6. Train Dynamics 1: Applications
7. Train Dynamics 2 – Applications
8. Rolling Stock – Wagon Design **
9. Rail Systems for Urban Transport – Metro Systems**
10. Light Rail Transit – TRAMS **
11. Students Seminars

** These classes will probably be taught in Portuguese by invited specialists - ONLINE

- **Goals**

This course is about railway vehicle dynamics, with a particular focus on European railway vehicles and standards. The main aim is to teach Unicamp students the typical approaches adopted in Europe to assess railway vehicle dynamics and the new "paradigm" of virtual homologation by means of multibody simulation, as stated by the EN14363 standard. The whole course is organized in 45 h of classes and computer lab with the multibody software Simpack.

- **Methodology**

The course will be issued in two modules. The first seven classes will be taught by prof. Nicolo Zampiere, from the Politecnico di Torino, Italy. The remaining classes will be taught by prof. Auteliano Santos, from the Faculty of Mechanical Engineering at UNICAMP, and professionals and researchers in the railway area in Brazil.

- **Class Schedule:**

Classes will be held from 14:00 to 18:00 pm, in the first two weeks of July 2025. Online Classes will be scheduled with the students and presenters

- **Quizzes and Seminar:**

During the course, students take quizzes, one at the end of each class, and will have to prepare a paper about a topic linked to the railway. The students' seminar, when all students will present their paper, will be in the last two classes of the course. After that, students' papers must be submitted to a conference or journal to conclude the process. The grades will be issued based on the students' performance on the tests (50%) and on the quality of their papers and presentations (50%).

- **Course materials**

  - ***Railroad Vehicle Dynamics: A Computational Approach***, Shabana, A. A., Zaazaa, K. E. & Sygiyama, H. CRC Press. 2007. ISBN: 1420045814
  - ***Handbook of Railway Vehicle Dynamics, Second Edition (2nd ed.)*** *Iwnicki, S., Spiryagin, M., Cole, C., & McSweeney, T. (Eds.) 2019. CRC Press.*
  - ***Design and Simulation of Rail Vehicles (1st ed.)*** Spiryagin, M., Cole, C., Sun, Y. Q., McClanachan, M., Spiryagin, V., & McSweeney, T. (2014). CRC Press.

- ***Design and Simulation of Heavy Haul Locomotives and Trains (1st ed.)*** Spiryagin, M., Wolfs, P., Cole, C., Spiryagin, V., Sun, Y.Q., & McSweeney, T. (2016). CRC Press.
- Class Notes and suggested papers

- **Professors**

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