Design of Steel and Composite Structures:

Calendar: 2nd Year 1st Semester

Contact Hours: 45h00 T/P + 7h30 OT

Syllabus:
1. Steel Structures
Fundamental Concepts of plate instability phenomena. Resistance of Class 4 cross-sections to the axial and flexural actions. Torsion and warping. Security check to torsion. Influence of shear. Security check of columns, beams and beam-columns of class 4.
2. Steel Concrete Composite Structures 2
Fundamental concepts. Design of composite beams with partial connection and their influence over the actuating efforts, resistant efforts and deformations. Composite columns. Resistance to axial and flexural actions and shear. Composite slabs. Profiled sheets and connection. Flexural and shear. Behaviour in constructive phase and service. Constructive placement for all elements listed.
3. Connections
Fundamental Concepts. Component Method. Beam-column connections. Column bases. Connections of triangulated structures.

Intended learning outcomes of the curricular unit:
The students attending this course already have some knowledge and skills in the field of steel and composite structures. The intention now is to deepen and extend their knowledge to the areas not already covered in the course, and to acquire skills to fully undertake projects of steel and composite structures. The training will focus particularly on the security check of the Class 4 cross sections, namely the shear instability of the web and its resistance to transverse loads, the efforts interaction in the cross section and also along the beams, columns and beam column. We shall study the elastic global analysis frames with semirrigid connections and plastic global analysis. Regarding composite structures intended to address the security check of slabs and beams and composite steel-concrete composite joints.

Demonstration of the syllabus coherence with the curricular unit's intended learning outcomes:
In the course, some emphasis is given to show how to perform the various projects of Steel and Composite Structures, presenting of atual example cases, and introducing the students to the formal reasons of its design and other aspects of the implementation of the project. While it is usual for bridges, in buildings we also can have large span welded beams where the phenomenon of web buckling is potential. So that phenomena should be studied in the course. Often for economic reasons, we use of pieces of steel cold-formed, as in roof beams, which are slender section of class 4 and so their learning. It is justified the plastic analysis of frames as in industrial sheds, as well the semirrigid connections because of reasons of largest economy. It is then necessary to design the connection to strength and stiffness provided by the component method. The composite structures have had particular success in commercial buildings because of the speed of construction where the role of composite beams, slabs and columns are relevant. So is tis justified the coherence between

program content and objetives of this course, which is a complement of the training in steel and composite structures of this course

Teaching methodologies (including evaluation):

It is introduced the theoretical matters based on the exposure of slides. Whenever possible we present photographs of real work situations to clarify the issues under analysis. In some classes it is presented real cases indicating aspects of building design and its implementation in work. This information is important for students to take correct decisions on practical work to develop by their selves. In the practical activities are worked demonstrative exercises of theoretical concepts. The students also have to be able to extrapolate the knowledge to the real situation of their work. A review consists of making a work group with oral defense, and a theoretical test with a minimum score of 8.0 marks in each component. They may repeat the theoretical part of the normal exam date. There will be an examination of in the regular season or appeal season, with both theoretical and practical for those who does not opted to the class work.