

LIST OF PROJECTS OFFERED TO INCOMING STUDENTS FROM THE COOPER UNION UNIVERSITY

The University of Burgos is delighted to welcome students from The Cooper Union. Several research groups have been contacted and, as a result, there are various projects offered to the students interested in visiting our Institution:

Technological aids for disabled people.

PROJECT DESCRIPTION: This project comprises various offers in one. We are currently working on both mechanical and electronic design and manufacturing. The goal is always the development of technological aids for the disabled population. Our research line combines the design of wireless electronic devices, along with custom made mechanical actuators. Most users of our developments are children affected by severe mobility impairments.

WHAT WE OFFER TO COOPER UNION STUDENTS:

1. Design and manufacturing of simple, low cost, low power electronic devices.
2. 3D design and manufacturing of custom made actuators. This involving 3D scanning and printing techniques.
3. Development of computer/mobile applications for disabled users.

STUDENTS PROFILES:

1. Electrical & Computer Engineering.
2. Mechanical Engineering, Interdisciplinary Engineering.
3. Electrical & Computer Engineering.

COORDINATOR/CONTACT PERSON: Dr. José M. Cámara (checam@ubu.es).

Thermodynamic properties at high pressure and high temperature of new bio-fuels obtained from renewable sources.

PROJECT DESCRIPTION: As the availability of petroleum-based liquid fuels is becoming increasingly problematic, alternative renewable biofuels attract growing research and development and industry interest, moreover they allow to reduce CO₂ emissions and to support the agricultural community.

Better knowledge of fuel properties would lead to better designs and shorter development times of everything from fuel production facilities, the required blended process to emission control systems. Thermophysical properties of biofuels are required to efficiently design of the processes

involved in their production, distribution, and utilization. They are also needed to develop and validate physicochemical models, the tools employed in process design and product development.

In a first stage, there is an addition of different biogenic products to fuels and their quality becomes more important requiring reference materials with well- characterized reference values. Bioethanol or bioETBE (produced using bioethanol) are being used for the formulation of biogasolines. But higher alcohols ($\geq C_4$) butanols y pentanols and several other oxygenated compounds such as cyclic ethers (cellulose-derive oxygenates) are being studied because they may have higher energy density, lower vapor pressure and lower affinity for water to be mixed with conventional fuels.

This project concerns with the accurate measurement, correlation and prediction of thermodynamic and other thermophysical properties of fuel related mixtures such as density, viscosity, isobaric heat capacity, vapor-liquid equilibrium behaviour, water immiscibility range, distillation curve, mixing enthalpy and heating values, at different pressure and temperature conditions. This study involves standard mixtures measuring and simulating the behaviour of bioalcohol or bioether with surrogate hydrocarbon mixtures and also actual gasolines with the same bio-oxygenates to compare the predictive capacity of the biogasoline model and fulfil the production design. This project would contribute to the international effort towards developing and using new biofuels.

STUDENTS PROFILES: Mechanical Engineering, Chemical Engineering, Physics, Chemistry.

COORDINATOR/CONTACT PERSON: Dr. Eduardo Montero (emontero@ubu.es).

Design of components in mechanical engineering, involving fatigue and fracture of metallic materials.

STUDENTS PROFILES: Mechanical Engineering.

COORDINATOR/CONTACT PERSON: Dr. Jesús M. Alegre (jalegre@ubu.es).

Structural analysis for mechanical engineering.

STUDENTS PROFILES: Mechanical Engineering.

COORDINATOR/CONTACT PERSON: Dr. Jesús M. Alegre (jalegre@ubu.es).