

Systems engineering and Mechatronic



SCHOOL

Polytech Graduate School of
Engineering



CAMPUS

Belle-Beille



LEVEL

Engineering 4th year



OPEN TO EXCHANGE STUDENTS

Yes



SEMESTER

Fall (S1)

> **Degree course:** Quality, Innovation and Reliability Engineering

> **Teaching unit:** UE 7-2 Science and technologies

> **Course language:** English

> **Duration (hours):** 40

> **ECTS:** 3

> **Teacher(s):** Nizar Chatti

> **Assessment:**

Continuous assessment

Final exam

> **Teaching methods:**

Lecture course 8 hours

Tutorial course hours

Practical work 32 hours

Case study

Project

COURSE DESCRIPTION

Introduction to mechatronic systems

_ Methodology for testing in industry

_ Introduction to Bond Graph methodology

_ Integrated design for multiphysical systems

_ Causality and systematic generation of behavioural equations

_ Mathematical modeling and structural analysis

_ Embedded diagnosis approaches

_ Conclusion

OBJECTIVES

Acquiring multidisciplinary skills on dynamic modeling of Engineering systems independently of their physical nature -

Systematic approach for global analysis of complex multiphysical systems -

Finding innovative engineering solutions -

Deduction in systematic way state equations and their simulation of industrial systems -

Training with new software tools for integrated design and simulation of industrial systems

PREREQUISITES

Mechanical engineering, electronic engineering, physical modeling, - programming

SELECTIVE BIBLIOGRAPHY

D. Karnopp, R. Rosenberg "Systems dynamics : a unified approach", John Wiley and sons, 1975, 1991 (2nde édition)

R. Rosenberg, D. Karnopp "Introduction to physical system dynamics", series in mechanical engineering, Mac Graw Hill, 1983

J. Thoma "Introduction to bond graphs and their applications", Pergamon Press, 1975

N. Chatti et al. "Model-based approach for fault diagnosis using set-membership formulation" International journal of Engineering Applications of Artificial Intelligence, pages 307-319, vol. 55, 2016.

N. Chatti et al. "Signed Bond Graph for multiple faults diagnosis", International journal of Engineering Applications of Artificial Intelligence, pages 134-147, 2014.

B. Ould-Bouamama, N. Chatti and A.-L. Gehin "SBG for health Monitoring of Fuel Cell System" ICREGA'14-Renewable Energy: Generation and Applications, Springer International Publishing, pages 73-85, 2014.