INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

DPT GENIE ELECTRIQUE
ELECTRICAL ENGINEERING
INSA Campus LyonTech - 8 rue de la physique
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Electrotechnique et Electronique de Puissance

Conversion of Electrical Energy

IDENTIFICATION

CODE :	GE-5-S1-EC-CEE
ECTS :	12.0

HOURS

Lectures :	138.0 h
Seminars :	51.0 h
Laboratory :	48.0 h
Project :	12.0 h
Teacher-student contact :	249.0 h
Personal work :	55.0 h
Total :	304.0 h

ASSESSMENT METHOD

Three writing exams of 2 hours each (CEE1, CEE2, CEE3)
One oral presentation for CEE1 Project (results and oral presentation)
FEM Mark
Pratical Lab Mark

TEACHING AIDS

Text books courses and practical laboratory

TEACHING LANGUAGE

French

CONTACT

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AIMS

CEE1
Know the French market of electricity,know how a thermal central works,know the different aspects linked in solar energy and in wind energy (solar and wind ressources, principles of conversion, materials and equipment, legislation). Give to the future engineer the needed knowledges on the electrical energy production and on renewable energies: Wind Energy, photothermal and photovoltaic conversions.
CEE2
Know various techniques to product heat in industry, know the electrical distribution network ,know how a battery works, know the various types of batteries and their characteristics, know how to choose a battery for a dedicated application,know the electrical circuits needed for the battery use. Learn the know-how around new applications of electricity in order to modernize or develop new industrial systems or equipments.
Battery basics to understand how battery works and to be able to choose the best solution in term of technology and dedicated electrical circuits.
CEE3
Know how to describe multiphysical couplings and how to use them in smart systems,know equations linked to these couplings and to these systems,know the tools to solve them.
Give the futur enginner the needed klowedges on smart systems and electroactive actuators to develop new systems.

CONTENT

CEE1
1 Sources of electrical energy and conversion (26h)
2 Renewable Energy (38h)
3 Practical Lab (6h)

CEE2
1 Quality and Industrial Applications of electricity (11h)
2 Electrochemical conversion and Battery(20h)
3 Practical Laboratory (3h)

CEE3
1 Multiphysics coupling (37h)
2 Smart Systems (Course (12h) and Project (12h))
3 Introduction to the finite element method ANSYS (4h)
4 Modelling based on the finite element method (Lecture 8h)
5 Practical Laboratory (3h)

BIBLIOGRAPHY

CEE1
Wind energy : J.F.Manwell, J.G.Macgowan, A.L.Rogers,John Wiley and sons(2002)
Photopiles solaires : A.Ricaud,press Poly.et Univ.Romandes(1997)
Modelling photovoltaic systems : L.Castaner, S.Silvestre, John Wiley and sons(2002)

CEE3
Piezoelectric actuators and ultrasonics motors , K Uchino, Electronic material sciences and technologies, Kluwer Academic Publi (1997)
OC. Zienkiewicz. La méthode des éléments finis. McGraw-Hill, 1979.
PP. Silvester, RL, Ferrari. Finite elements for electrical engineers, Cambridge University Press,1990.

PRE-REQUISITE

CEE1
Module GE-3-TT
Fundamentals of Electrical Engineering

CEE2
Fundamentals of Electrical Engineering

CEE3
Fundamentals in Mathematic and Physic

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