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Enseignants	De Jaeger Emmanuel ;Gerin Patrick (coordinateur(trice)) ;Jeanmart Hervé ;
Langue d'enseignement	Anglais
Lieu du cours	Louvain-la-Neuve
Préalables	Background in physics and (bio)chemistry Dedicated introductory modules are available for ENVI students (self learning) Dedicated modules are available for EPL/AGRO students (self learning)
Thèmes abordés	The course aims at providing the students with a broad, diversified and multidisciplinary background on renewable energy. It gives a global view of the various renewable energy sources and uses, with emphasis on the available resources, conversion technologies, environmental impacts, and socio-economical aspects of their development.
Acquis d'apprentissage	<p>A la fin de cette unité d'enseignement, l'étudiant est capable de :</p> <p>Contribution of the course to the program objectives (N°)</p> <p>EPL :</p> <p>Partim A and B : AA1.1, AA1.2, AA1.3, AA6.1, AA6.3 Partim B : AA2.1, AA2.2, AA2.3, AA6.2</p> <p>AGRO :</p> <p>Partim A and B : AA2.1, AA2.3, AA2.4, AA7.3 Partim B : AA4.1, AA4.2, AA4.3, AA4.4, AA4.5</p> <p>Specific learning outcomes of the course</p> <p>Partim A:</p> <p>1</p> <ul style="list-style-type: none"> • Utilize the main orders of magnitude and units in the field of renewable energy • Master the main physical, chemical, biological, technical and environmental aspects of renewable energy systems and technologies • Calculate the preliminary sizing of renewable energy technologies • Compare the conversion technologies from different perspectives (technical, energy, and environmental) <p>Critique scientific documents on renewable energy related topics.</p> <p>Partim B :</p> <ul style="list-style-type: none"> • Select the right conversion technologies for an application considering technical, environmental and economic aspects • Model the components of renewable technologies towards their simulation and optimization • Design (optimize) a renewable energy system for a specific application
Modes d'évaluation des acquis des étudiants	Written examination (Partim A&B) + continuous assessment (Partim B)
Méthodes d'enseignement	<ul style="list-style-type: none"> • Formal lectures • Seminar by experts • Reading of scientific papers • Problem based learning (Partim B)
Contenu	<p>Partim A - Introduction to renewable energy</p> <p>General introduction (energy outlook, energy efficiency, place of renewable energy) (3h)</p> <p>Solar energy (solar resource characterisation, photovoltaic effect, PV panels, Converters, etc.) (8h)</p> <p>Wind energy (mechanical aspects, Betz law, BEM, electrical aspects) (4h)</p> <p>Hydro power (types of turbines, efficiency, fluid aspects) (3h)</p> <p>Biomass (solar to biomass conversion, biomass composition, thermochemical conversion, biological conversion) (5h)</p> <p>Energy storage (electrical, mechanical, thermal) (3h)</p>

	<p>Partim B - Advanced topics in renewable energy</p> <p>Concentrated solar Power CSP / solar drying (4h-4h)</p> <p>Design and control of wind turbines (4h-4h)</p> <p>Design of a small hydraulic turbine (4h-4h)</p> <p>Mass and energy balance of biomass conversion routes (4h-4h)</p> <p>Design of an energy storage unit (4h-4h)</p>
Ressources en ligne	Moodle
Faculté ou entité en charge:	ENVI

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master [120] : ingénieur civil mécanicien	MECA2M	5		
Master [120] : bioingénieur en sciences agronomiques	BIRA2M	5		
Master [120] : ingénieur civil en chimie et science des matériaux	KIMA2M	5		
Master [120] : ingénieur civil électricien	ELEC2M	5		
Master [120] : bioingénieur en sciences et technologies de l'environnement	BIRE2M	5		
Master [120] : ingénieur civil électromécanicien	ELME2M	5		
Master [120] : bioingénieur en chimie et bioindustries	BIRC2M	5		
Master de spécialisation interdisciplinaire en sciences et gestion de l'environnement et du développement durable	ENVI2MC	5		
Master [120] en sciences et gestion de l'environnement	ENVI2M	4		