2021-2022	Mechanical Engineering	Year 4 - Sem. 8
MECA428	**Internal combustion engine II**	Mandatory
ECTS: 2	*Coordinator:* Dr Rabih Dib	*Language:* English/French
Total hours: 24 **h**	*Lectures:* Dr Rabih Dib, Dr Carine Habchi, Dr Majed Morkos	

Description:

The course covers the following subjects: Ignition order, Mixture formation in petrol and Diesel internal combustion engines. Basic carburetor fixed and variable Venturi carburetors. Indirect injection system: K, Kl, KE, L, LH and mono Jetronic, direct injection system, stratified load. Diesel injection system: in-line pump, distribution pump, RED diesel electronic control, common rail, injector-pump.

Learning outcomes:

- Determine the firing order of ICE,
- Understand the principle of elementary carburetor,
- Understand the need of correction circuit for different working condition of the ICE,
- Understand the working principle of fixed venturi carburetor and his different circuit,
- Calculate the bleeder dimension for a given air flow,
- Understand the working principle of variable venturi carburetor and his different circuit,
- Understand the disadvantage of carburetor vs injection system,
- Learn the different parts of petrol injection system,
- Understand the working principle of different injection system and their strategies to achieve required power and to respect pollution norm,
- Understand the diesel combustion process,
- Learn the different parts of diesel injection system,
- Learn the different type of diesel injection system and their principle of work,
- Understand how the tuning of these systems impact the performance of the ICE.

Content:

- Ignition order.
- Carburetion system: Basic carburetor, Variable pressure carburetor: 5 carburetor circuits (cold start, idle, part load, full power, return pump), Variable venturi carburetor.
- Indirect injection system: K-Jetronic, Kl-Jetronic, KE-Jetronic, L-Jetronic, LH-Jetronic, Mono-Jetronic.
- Direct injection, stratified charge.
- Diesel engines: Combustion, Diesel circuit: low pressure circuit, feed pump, filter, high pressure circuit, high pressure pump, injection timing controller, speed controller, injector, High pressure pump, In-line pump, Distributor pump, Diesel RED electronic control, Injector pump, Common rail system.

References:

- H. Mèmeteau. « Technologie fonctionnelle de l'automobile. Tome 1 Le moteur et ses auxiliaires ». 4ème édition. Dunod 2002.
- R. Bosch. « Automotive Handbook ». 5th edition. 2002. Society of Automotive Engineers (SAE).
- Konrad Reif. Bosch, Diesel Engine Management Systems and Components, 2014, Springer Vieweg.
- Bernard Challen. Diesel Engine Reference Book, 2nd Edition, Butterworth-Heinemann.
- Charles O. Probst. Bosch Fuel Injection and Engine Management: How to Understand, Service and Modify, Robert Bentley, Inc.

Evaluation Method:

Assessment in the following areas will be converted to points, to compute your final grade in this course:

- Mid-Term
- Final Exam
- Home Works

Description :

Le cours couvre les sujets suivants : Ordre d'allumage, formation du mélange dans les moteurs à combustion interne essence et Diesel. Carburateur de base : carburateurs à Venturi fixe et variable. Système d'injection indirecte : K, K, KE, L, LH et mono Jetronic, système d'injection directe, charge stratifiée. Système d'injection diesel : pompe en ligne, pompe de distribution, commande électronique RED diesel, rampe commune, injecteur-pompe.