



AL.Balga Applid University

جامعة البلقاء التطبيقية

تأسست عام 1997

ENGINEERING PROGRAM	
Specialization	Hybrid Vehicles Technology
Course Number	
Course Title	Hybrid Electric Vehicles
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

تطبق هذه الخطة الدراسية اعتباراً من بداية العام الدراسي 2017/2016



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Brief Course Description:

- Introduction to Hybrid Electric Vehicles, Concept of Hybrid Electric Drive Trains, Architectures of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel Hybrid Electric Drive Trains, Torque-Coupling Parallel Hybrid Electric Drive Trains, Speed-Coupling Parallel Hybrid Electric Drive Trains, Torque-Coupling and Speed-Coupling Parallel Hybrid Electric Drive Trains.

Course Objectives:

- Learn the basics of Hybrid Electric Vehicles
 - Starters workHybrid Electric Vehicles
 - Classification systems partsHybrid Electric Vehicles
 - Principles and Applications with Practical Perspectives
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Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Introduction to Hybrid Electric Vehicles	<ul style="list-style-type: none">• Basically, any vehicle power train is required to Basics of the EV• Patterns of combining the power flow• Classification of hybrid electric vehicles)	2 Weeks
2.	Architectures of Hybrid Electric Drive Trains	<ul style="list-style-type: none">• Series Hybrid Electric Drive Trains• Parallel Hybrid Electric Drive Trains	2 Weeks
3.	Series Hybrid Electric Drive Trains	<ul style="list-style-type: none">• Configuration of a series hybrid electric drive train• Series hybrid electric drive trains potentially have the following operation	3 Weeks
4.	Parallel Hybrid Electric Drive Trains	<ul style="list-style-type: none">• Configuration of a parallel hybrid electric drive train	2 Weeks
5.	Torque-Coupling Parallel Hybrid Electric Drive Trains	<ul style="list-style-type: none">• requirements, engine size and engine characteristics, motor size and motor characteristics, etc.	2 Weeks
6.	Speed-Coupling Parallel Hybrid Electric Drive Trains	<ul style="list-style-type: none">• Hybrid electric drive train with speed coupling of planetary gear unit• operation modes	2 Weeks

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7.	<ul style="list-style-type: none"> • Torque-Coupling and Speed-Coupling Parallel Hybrid Electric Drive Trains. 	<ul style="list-style-type: none"> • Alternative torque- and speed-coupling hybrid electric drive train with transmotor • Integrated speed- and torque-coupling hybrid electric drive train with a transmotor • Integrated speed- and torque-coupling hybrid electric drive train (Toyota Prius) 	3 Weeks
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Exams		Percentage	Data
Exams	Mid term exam	40%	
	Assignments	10%	
	Final Exams	50%	
Discussions and lecture presentations			

Teaching Methodology:

- ❖ Lectures and presentations

Text Books & References

Textbooks:

- ❖ **Modern Electric, Hybrid Electric, and Fuel Cell Vehicles**

- [1] M. Ehsani, *The Electrically Peaking Hybrid System and Method*, U.S. patent no. 5,586,613, December 1996.
 - [2] C.C. Chan and K.T. Chau, *Modern Electric Vehicle Technology*, Oxford University
 - [3] Y. Gao, K.M. Rahman, and M. Ehsani, The energy flow management and battery energy capacity determination for the drive train of electrically peaking hybrid, *Society of Automotive Engineers (SAE) Journal*, Paper No. 972647, Warrendale, PA, 1997.
 - [4] Y. Gao, K.M. Rahman, and M. Ehsani, Parametric design of the drive train of an electrically peaking hybrid (ELPH) vehicle, *Society of Automotive Engineers (SAE) Journal*, Paper No. 970294, Warrendale, PA, 1997.
 - [5] Y. Gao and M. Ehsani, *New Type of Transmission for Hybrid Vehicle with Speed and Torque Summation*, U.S. patent pending.
- [11] Y. Gao and M. Ehsani, *Series-Parallel Hybrid Drive Train with an Electric Motor of Floating Stator and Rotor*, U.S. Patent pending.

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