UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

INTEGRATED POWER MANAGEMENT

Anno immatricolazione	2019/2020
Anno offerta	2020/2021
Normativa	DM270
SSD	ING-INF/01 (ELETTRONICA)
Dipartimento	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
Corso di studio	ELECTRONIC ENGINEERING
Curriculum	Microelectronics
Anno di corso	2°
Periodo didattico	Primo Semestre (28/09/2020 - 22/01/2021)
Crediti	6
Ore	46 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	BONIZZONI EDOARDO (titolare) - 3 CFU RUZZA STEFANO - 3 CFU
Prerequisiti	Basic knowledge of circuit theory and electronics is absolutely necessary. Moreover, to effectively follow the course, basic knowledge of the MOS transistor theory, of integrated devices and of CMOS technologies is required, although along the course most of these concepts will be recalled.
Obiettivi formativi	After explaining in detail the operation of the basic power converter schemes, by providing proper and solid theoretical background, the course describes the design techniques and trade-offs of integrated switched-mode DC-DC converters and offers to the student an industrial-oriented perspective of the covered topics. The described circuits, design techniques, and critical issues are the basis of integrated power management systems, nowadays widely used

	in almost all the electronics market segments. At the end of the course, the student will have learnt the basic power converter schemes (both continuous-time and switched-mode, both inductive and inductor-less) operation, how to control them for different applications, and the design and layout techniques specific for power converter applications.
Programma e contenuti	- Introduction to power electronics and definitions of the most common specifications and figures of merit - Continuous-time basic topologies: low-drop out (LDO) circuits - Inductive switched-mode basic topologies: buck, boost, buck-boost, and cuk converters - Switched-capacitor basic topologies - Discrete passive components: optimal selection, derating, and practical problems - Integrated passive components: optimal selection, and practical implementation problems - Integrated devices commonly used in power converters: diode, MOS and IGBT - The Miller plateau and capacitor bootstrapping techniques - Gate driver circuits - Variable and fixed frequency control loops - Voltage and current mode control loops - Resonant converters with hard and soft switching approach - Integrated isolated power converters - Advanced switched-capacitor circuits - Layout techniques for power applications - Thermal aspects of the design of power converters
Metodi didattici	Lectures (hours/year in lecture theatre): 48 Lectures use electronic presentations, supported by additional explanations and numerical examples at the blackboard.
Testi di riferimento	R.W. Erickson, and D. Maksimovic, “Fundamentals of Power Electronics”, Kluwer Academic Publisher
Modalità verifica apprendimento	The final exam consists of an oral discussion and the final remark is expressed on a scale of 30.
Altre informazioni	=
Obiettivi Agenda 2030 per lo sviluppo sostenibile	$lbl_legenda_sviluppo_sostenibile