UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

INTEGRATED POWER MANAGEMENT

Enrollment year	2019/2020
Academic year	2020/2021
Regulations	DM270
Academic discipline	ING-INF/01 (ELECTRONICS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC ENGINEERING
Curriculum	Microelectronics
Year of study	2°
Period	1st semester (28/09/2020 - 22/01/2021)
ECTS	6
Lesson hours	46 lesson hours
Language	English
Activity type	WRITTEN AND ORAL TEST
Teacher	BONIZZONI EDOARDO (titolare) - 3 ECTS RUZZA STEFANO - 3 ECTS
Prerequisites	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.
Learning outcomes	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.
Course contents	- 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
Teaching methods	Lectures (hours/year in lecture theatre): 48 Lectures use electronic presentations, supported by additional explanations and numerical examples at the blackboard.
Reccomended or required readings	R.W. Erickson, and D. Maksimovic, “Fundamentals of Power Electronics”, Kluwer Academic Publisher
Assessment methods	The final exam consists of an oral discussion and the final remark is expressed on a scale of 30.
Further information	=
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile