



### INTEGRATED POWER MANAGEMENT

Anno immatricolazione	2020/2021
Anno offerta	2021/2022
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 (27/09/2021 - 21/01/2022)
Crediti	6
Ore	46 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	BONIZZONI EDOARDO (titolare) - 3 CFU FRATTINI GIOVANNI - 3 CFU
Prerequisiti	<p>Basic knowledge of circuit theory and electronics is absolutely necessary.</p> <p>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.</p>
Obiettivi formativi	<p>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.</p> <p>The described circuits, design techniques, and critical issues are the basis of integrated power management systems, nowadays widely used</p>

	<p>in almost all the electronics market segments.</p> <p>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.</p>
<b>Programma e contenuti</b>	<ul style="list-style-type: none"> <li>- Introduction to power electronics and definitions of the most common specifications and figures of merit</li> <li>- Continuous-time basic topologies: low-drop out (LDO) circuits</li> <li>- Inductive switched-mode basic topologies: buck, boost, buck-boost, and cuk converters</li> <li>- Switched-capacitor circuits</li> <li>- Discrete passive components: optimal selection, derating, and practical problems</li> <li>- Integrated passive components: optimal selection, and practical implementation problems</li> <li>- Integrated devices commonly used in power converters: MOS and IGBT</li> <li>- Technologies for integrated power converters and their parasitic elements</li> <li>- The Miller plateau and capacitor bootstrapping techniques</li> <li>- Gate driver circuits</li> <li>- Variable and fixed frequency control loops</li> <li>- Voltage and current mode control loops</li> <li>- Resonant converters with hard and soft switching approach</li> <li>- Isolated power converters</li> </ul>
<b>Metodi didattici</b>	<p>Lectures (hours/year in lecture theatre): 48</p> <p>Lectures use electronic presentations, supported by additional explanations and numerical examples at the blackboard.</p>
<b>Testi di riferimento</b>	<p>R.W. Erickson, and D. Maksimovic, "Fundamentals of Power Electronics", Kluwer Academic Publisher</p>
<b>Modalità verifica apprendimento</b>	<p>The final exam consists of an oral discussion and the final remark is expressed on a scale of 30.</p>
<b>Altre informazioni</b>	<p>=</p>
<b>Obiettivi Agenda 2030 per lo sviluppo sostenibile</b>	<p><a href="#">\$lbl legenda sviluppo sostenibile</a></p>