ELEC2005 Weekly Plan & Key Information

Version 1.1 (check iLearn for updates)

Week	Lecture date Tuesday	Lecture Topics	Staff	Book chapters	Assignment	Laboratory/workshop session	Lab/ workshop location
1	25/07/23	Unit overview, prereq review, circuit analysis and amplifiers.	DP	Sedra Ch. 1.1-1.5, 2		No laboratory or workshop session	44 Waterloo Rd, Room G65
2	01/08/23	Non-linearity, Diodes, diode models and circuits	DP	Sedra Ch. 3		Lab 1: Introduction to LTspice and Analog Discovery Kits	44 Waterloo Rd, Room G65
3	08/08/23	BJT concepts, models. Intro theory	DP	Sedra Ch. 4	Assign 1 posted	Lab 2: Diode Circuits	44 Waterloo Rd, Room G65
4	15/08/23 Submit Assign 1	BJT large-signal and small-signal analysis	DP	Sedra Ch. 4		Tutorial Workshop 1: Diodes and BJTs	44 Waterloo Rd, Room G65
5	22/08/23	MOSFET concepts, models. Intro theory	DP	Sedra Ch. 5	Assign 1 due	Lab 3: BJT Amplifier	44 Waterloo Rd, Room G65
6	29/08/23 Submit Assign 2	MOSFET Circuits, large-signal and small-signal analysis	DP	Sedra Ch. 5	Assign 2 posted	Lab 4: MOSFET Amplifier	44 Waterloo Rd, Room G65
7	05/09/23	Power Semiconductors, Thyristors, IGBT	DP	Mohan Ch.2.1-2.4		Tutorial Workshop 2: MOSFETS and Power Semiconductors	44 Waterloo Rd, Room G65
	11/09/23 22/09/23	Session Break					
8	26/09/23	AC circuits review, PFC: Ohm's law, KCL, KVL, series, parallel, time-domain AC power, phasors, impedance, power factor, power triangle, power factor correction (PFC)	LC	Lecture slides, Glover Ch. 2	Assign 2 due	Lab 5: Single-phase ac circuits	44 Waterloo Rd, Room G18
9	03/10/23	Three-phase systems: 3ϕ power, star and delta connections, balanced and unbalanced 3ϕ systems	LC	Lecture slides, Glover Ch. 2	Assign 3 posted	Lab 6: Power factor correction	44 Waterloo Rd, Room G18
10	10/10/23	Magnetics and transformer: Review of magnetic circuits, inductance calculation, power transformer principles	LC	Lecture slides, Mohan Ch. 7, Glover Ch. 3	Assign 3 due	Tutorial Workshop 3: Single and three-phase ac circuits, power calculation, power factor correction	44 Waterloo Rd, Room G18
11	17/10/23	Principles of renewable-energy based power systems: renewables, PV energy & power conversion	LC	Lecture slides, (Masters Ch. 8 -)	Assign 4 posted	Lab 7: Single-phase transformer	44 Waterloo Rd, Room G18
12	24/10/23	Principles of battery energy storage and electric vehicles	LC	Lecture slides, (Masters Ch. 9 -; LabVolt Battery Manual)		Lab 8: Three-phase circuits	44 Waterloo Rd, Room G18
13	31/10/23	Review Lecture	LC		Assign 4 due	Tutorial Workshop 4: Magnetics, solar energy conversion, battery storage	44 Waterloo Rd, Room G18

Technology Types:

- Electronics Component – Nonlinear devices and lunch-box kit labs using the AD2
- Electrical Component – High Voltage LabVolt teaching equipment

Learning outcomes:

1. Distinguish the main technical features of electrical and electronic technologies used in renewable energy and storage, electrical transportation, robotics and autonomous systems
2. Identify operational characteristics of typical power converters and electrical machines for a range of industrial applications
3. Demonstrate fundamental knowledge in power computations in AC systems
4. Explain the working principles of key nonlinear devices such as transistors and power semiconductors
5. Design, simulate, and perform hardware evaluation of circuits with one or more nonlinear components

Assessment:

Assessment Type	Assessment Weightings (%)
Pre-lecture mini quizzes	10
Laboratories	25
Assignments	30
Final Exam	35

Textbooks

1. Sedra, A. S., & Smith, K. C. (2015). *Microelectronic circuits (International seventh edition.)*. New York: Oxford University Press. (Available MQ Library and for purchase).
2. Glover, J. D., Overbye, T. J., & Sarma, M. S. (2017). *Power system analysis & design (Sixth edition)*. Boston, MA: Cengage Learning. (Available online MQ Library and for purchase - use code "WOW10" to receive a 10% discount at checkout).
3. Mohan, N. (2012). *Power electronics: a first course*. Hoboken, N.J: Wiley. (Available online MQ Library and for purchase).

Textbooks for consultation only

4. Horowitz, P., & Hill, W. (1989). *The art of electronics (2nd ed.)*. Cambridge: Cambridge University Press. (Available MQ Library).
5. Masters, G. M. (2013). *Renewable and efficient electric power systems (Second edition)*. Hoboken, New Jersey: John Wiley & Sons Inc. (Available MQ Library).
6. Mohan, N., Robbins, W. P., & Undeland, T. M. (2003). *Power electronics : converters, applications, and design (3rd ed.)*. John Wiley & Sons. (Available online MQ Library)