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**Ano Letivo** 2023-24

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**Unidade Curricular** ANÁLISE DE CIRCUITOS E INTRODUÇÃO À ELETRÓNICA

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**Cursos** BIOENGENHARIA (1.º ciclo)

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**Unidade Orgânica** Faculdade de Ciências e Tecnologia

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**Código da Unidade Curricular** 19071018

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**Área Científica** ENGENHARIA ELECTRÓNICA

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**Sigla**

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**Código CNAEF (3 dígitos)** 522

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**Contributo para os Objetivos de Desenvolvimento Sustentável - ODS (Indicar até 3 objetivos)** 9 12 3

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**Línguas de Aprendizagem** Português (e Inglês no caso de haver estudantes estrangeiros)

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**Modalidade de ensino**

Presencial, misto ou on-line (de acordo com a situação pandémica)

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**Docente Responsável**

João Miguel Gago Pontes de Brito Lima

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DOCENTE	TIPO DE AULA	TURMAS	TOTAL HORAS DE CONTACTO (*)
João Miguel Gago Pontes de Brito Lima	PL; T	T1; PL1	28T; 28PL

\* Para turmas lecionadas conjuntamente, apenas é contabilizada a carga horária de uma delas.

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ANO	PERÍODO DE FUNCIONAMENTO*	HORAS DE CONTACTO	HORAS TOTAIS DE TRABALHO	ECTS
2º	S2	28T; 28PL	156	6

\* A-Anual;S-Semestral;Q-Quadrimestral;T-Trimestral

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**Precedências**

Sem precedências

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**Conhecimentos Prévios recomendados**

Gerais

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**Objetivos de aprendizagem (conhecimentos, aptidões e competências)**

Proporcionar conhecimentos base de engenharia eletrotécnica que permitam aos licenciados compreender o funcionamento de circuitos e dispositivos eletrónicos. Salientam-se os objetivos:

- Conhecimentos sobre as técnicas de análise de circuitos lineares.
- Compreender o funcionamento e as aplicações de componentes eletrónicos. (componentes passivos e elementos ativos).
- Conhecimento básico sobre a utilização e sobre as limitações dos equipamentos de um laboratório de eletrotecnia.
- Proporcionar os conhecimentos de eletrónica necessários à compreensão dos conhecimentos a ministrar nas restantes disciplinas do curso

### Conteúdos programáticos

1. Métodos de análise
  2. Elementos armazenadores de energia
  3. Resposta transiente de circuitos
  
  4. Análise de circuitos em regime sinusoidal estacionário
  5. Dispositivos electrónicos
  6. Circuitos elementares com transístores
  7. Amplificadores e introdução aos amplificadores operacionais
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### Metodologias de ensino (avaliação incluída)

As aulas serão distribuídas por componentes Teórica e Prática Laboratorial.

Nas aulas teóricas será exposta a matéria recorrendo-se à resolução de exemplos sempre que tal seja necessário.

Nas aulas práticas laboratoriais serão resolvidos problemas ilustrativos dos temas abordados nas aulas teóricas e realizados trabalhos práticos envolvendo análise de circuitos.

Os trabalhos realizados nas aulas Práticas Laboratoriais serão avaliados resultando numa nota **PL**.

A nota final, **F**, é dada pelas seguintes fórmulas sendo **En** a nota do exame de época normal e **Er** a nota do exame de recurso.

Época Normal:

$$F = 0.2 \cdot PL + 0.8 \cdot En$$

Época de Recurso:

$$F = 0.2 \cdot PL + 0.8 \cdot Er$$

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### Bibliografia principal

- [1] Introduction to Electric Circuits Richard C Dorf and James A Svoboda Wiley 9th Edition, 2015
- [2] Engineering Circuit Analysis William H Hayt et al Mc Graw Hill 8th Edition, 2014
- [3] Engineering Circuit Analysis J David Irwin et al Wiley India 10th Edition, 2014
- [4] Fundamentals of Electric Circuits Charles K Alexander Matthew N O Sadiku M c Graw Hill 5th Edition, 2013
- [5] Network Analysis M.E. Vanvalkenburg Pearson 3rd Edition, 2014
- [6] Electric Circuits Mahmood Nahvi Mc Graw Hill 5th Edition, 2009
- [7] Circuit Analysis; Theory and Practice Allan H Robbins Wilhelm C Miller Cengage 5th Edition, 2013
- [8] Microelectronic Circuits, Adel S. Sedra and Kenneth C. Smith, 7th Edition.

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**Academic Year** 2023-24

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**Course unit** CIRCUIT ANALYSIS AND INTRODUCTION TO ELECTRONICS

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**Courses** BIOENGINEERING (1st cycle)

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**Faculty / School** FACULTY OF SCIENCES AND TECHNOLOGY

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**Main Scientific Area**

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**Acronym**

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**CNAEF code (3 digits)** 522

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**Contribution to Sustainable Development Goals - SGD (Designate up to 3 objectives)** 9 12 3

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**Language of instruction** Portuguese or English in case there are international students

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**Teaching/Learning modality** In presence, using on-line facilities, or a mixture of both according to the state of the pandemic situation.

**Coordinating teacher** João Miguel Gago Pontes de Brito Lima

Teaching staff	Type	Classes	Hours (*)
João Miguel Gago Pontes de Brito Lima	PL; T	T1; PL1	28T; 28PL

\* For classes taught jointly, it is only accounted the workload of one.

Contact hours	T	TP	PL	TC	S	E	OT	O	Total
	28	0	28	0	0	0	0	0	156

T - Theoretical; TP - Theoretical and practical ; PL - Practical and laboratorial; TC - Field Work; S - Seminar; E - Training; OT - Tutorial; O - Other

#### Pre-requisites

no pre-requisites

#### Prior knowledge and skills

Basic concepts

#### The students intended learning outcomes (knowledge, skills and competences)

To provide basic knowledge of electrical engineering to allow licensees to understand the operation of circuits and electronic devices. The following objectives are highlighted:

- Knowledge of linear circuit analysis techniques.
- Understanding of the operation and applications of electronic components. (passive components and active elements).
- Basic knowledge about the use and limitations of equipment in an electrotechnical laboratory.
- Provide the electronics knowledge necessary to understand the subsequent subjects of the course

### Syllabus

1. Methods of mesh analysis.
  2. Energy Storage Elements:
  3. Response of 1st and 2nd order circuits
  4. Analysis of Circuits in Stationary Sinusoidal Regimen
  5. Electronic devices
  6. Transistors Elementary Circuits
  7. Amplifiers and Introduction to Operational Amplifiers
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### Teaching methodologies (including evaluation)

Classes will be divided into Theoretical and Laboratory components.

In Theoretical classes, the subject will be exposed, resorting to the resolution of examples whenever necessary.

In Laboratory classes, problems illustrating the topics addressed in Theoretical classes will be solved and practical work will be carried out involving circuit analysis.

The works carried out in the Laboratory classes will be evaluated resulting in a **PL** grade.

The final grade, **F**, is given by the following formulas, where **En** is the grade for the regular exam and **Er** is the grade for the second exam.

Regular assesement:

$$F = 0.2 \cdot PL + 0.8 \cdot En$$

Second assesement:

$$F = 0.2 \cdot PL + 0.8 \cdot Er$$

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### Main Bibliography

- [1] Introduction to Electric Circuits Richard C Dorf and James A Svoboda Wiley 9th Edition, 2015
- [2] Engineering Circuit Analysis William H Hayt et al Mc Graw Hill 8th Edition, 2014
- [3] Engineering Circuit Analysis J David Irwin et al Wiley India 10th Edition, 2014
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