I. Course Information

Academic unit	School of Engineering
Department	Electrical, Computer and Telecommunications
Code	GEL313
English Title	Electronics
French or Arabic Title *(when applicable)*	Electronique
Type	☒ C ☐ CTP ☐ TP ☐ P ☐ TD ☐ S ☐ TH
Pre-requisites	GEL211
Co-requisites	GEL371
Number of credits	3
Contact hours per week	3
Delivery Language:	☐ French ☒ English ☐ Arabic ☐ Other (specify):
Offered	☒ Fall ☒ Spring ☐ Summer
Current Semester	202610
CRN	10721
Class Schedule	MF 12:30 pm – 01:45 pm

II. Course prerequisite knowledge and skills

Short description of what students should know about the topic, and which related skills they should have developed prior to registering for the course.

The knowledge acquired in the Electric Circuits course (GEL211) is what is mostly needed for a good understanding of the course. This is why GEL211 is a prerequisite.

III. Instructor

Name and Title	Chafic SAIDE Ph.D.
Category	☐ Full-time ☒ Part-time
Office	
Email / Teams	chaficsaide@usek.edu.lb *Replies are to be expected within the following 2 working days*
Office hours	

IV. Course Core Information

Course Description
Extended description of the subject matter of the course. Also include any technical characteristics of the course such as if it is required or an elective, or any requirements for enrollment.

This course introduces the physics of semiconductors to clearly explain the main electronic components: the PN junction diode, the Zener diode, their equivalent electrical models, and their applications. This is done for DC and AC circuits.

The course also defines the different functioning modes (blocked, linear, and saturated) of the bipolar junction transistors in both NPN and PNP configurations. A thorough analysis of bipolar junction transistors is done in DC mode to find the operation point of the circuit and in AC mode to control the current gain, the voltage gain, the input, and output impedances. This is studied in all three amplification configurations (common base, common emitter, and common collector) as well as in multi-stage amplifiers.

The study is extended to the MOSFET in all its types: the p-channel and the n-channel, depletion-type, and enrichment-type, defining different functioning modes and their corresponding models in DC and in small signals.

This course is mandatory for all Electrical, Computer, Telecommunications and Biomedical engineering students.

Course Goals
Short description of the main goals of the course.

In this course, students will learn to design simple electronic circuits for different applications (rectifier, limiting and clamping circuits, voltage regulators …).

Delivery Mode
Shot description on the teaching strategy and approach.

The program is delivered through a range of approaches including traditional face-to-face sessions as well as specifically designed on-line learning materials. The face-to-face sessions are conducted in a format to encourage interaction between learners. Exercises are prepared at home and corrected in class. Teacher and students meet 2 times per week, for a total of 3 hours. Two quizzes are scheduled around the 5th and 10th weeks as well as a final exam on week 15. The teacher can be contacted by email, via Teams or during office hours.

V. Course Learning Outcomes (LOs)

Enter all learning outcomes for the course (minimum 3, maximum 6). These may be mandated by the department. All learning outcomes should be measurable. Use "Action Words" as per the institutional guidelines: Writing Learning Outcomes.

After a successful completion of the course, students will be able to:

1. Explain the physics of conductors, insulators and semiconductors in both p and n configurations.
2. Design simple electronic circuits with PN junction diodes and Zener diodes for different applications (rectifier, limiting and clamping circuits, voltage regulators …).
3. Determine the DC bias response of BJT based circuits and determine the voltage gain of multi-stage circuits in small-signal models.
4. Determine the DC bias response of FET based circuits and determine the voltage gain of circuits in small-signal models.

VI. Course General Requirements

Writing Requirements

Students must be able to write precisely and coherently on the course topics in a manner that is comprehensible for the reader. Examples of such writing can be found in published papers, manuals, textbooks, and expository articles aimed at non-expert audiences.

Add any specific requirements related to your course.

Oral Requirements

Students must be able to express their thoughts clearly, pronounce correctly, listen actively, and participate effectively in discussions. Presentation skills, such as organization, confident delivery, and engaging the audience, are also important. Students should be adaptable in their communication style, open to different viewpoints, and demonstrate critical thinking skills.

Add any specific requirements related to your course.

Technical Requirements

Students should have basic computer literacy, including proficiency in word processing, internet research, and email communication. Additionally, depending on the field, students may need specific technical skills like programming, data analysis, laboratory techniques, or software proficiency.

The minimum technical skills required vary depending on the program or field of study. Students may need specific technical skills like programming, data analysis, laboratory techniques, or software proficiency. Add any specific requirements related to your course.

VII. Course Timetable and detailed schedule

Timetable

Week	Topic	LO(s)	Assessment Activities	Learning Activities
1	General introduction. Atomic structure, conductors, insulators, intrinsic and extrinsic semiconductors. PN junction. Physical	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students

	Diode functioning: Current-Voltage characteristic.			
2	Diode circuit analysis: different diode models (ideal, practical, real).	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
3	Half-wave and Full-wave rectifiers, Filtering. Limiting and Clamping circuits. The voltage doubler.	1, 2	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
4	Zener Diode, application: voltage regulation. Special diode types: LED, Photodiodes, Varactor, Schottky-Barrier diode.	1, 2, 3, 5	**Problem solving, Presentations, Test**	Interactive lecture with students' presentations on the different types of diodes
5	Bipolar Junction Transistor: Device Structure and Physical Operation. Current-Voltage characteristic of the Common-Emitter.	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
6	Bipolar Junction Transistor: DC Analysis, linear operation.	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
7	Application of the BJT as an amplifier and a switch.	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
8	Small-Signal Operation and Models: The Hybrid-π and the T models.	1	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
9	Basic BJT Amplifier configurations : CE amplifier, CB amplifier, and CC amplifier. Summary and Comparisons.	1, 2	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
10	Gain and impedance calculation	1, 2	**Problem solving, Test**	Interactive lecture with applied exercises solved by

				the instructor and the students
11	Multi-stage amplifiers	**1**	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
12	Field Effect Transistor: introduction	**1**	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
13	Field Effect Transistor: the MOSFET	**1**	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
14	Field Effect Transistor: amplifier circuits.	**1**	**Problem solving, Test**	Interactive lecture with applied exercises solved by the instructor and the students
15	**Final Exams**			

Schedule of Holidays, Make-up Sessions, Evaluations dates and Deadlines for Assignments.
USEK **Academic calendar** can be found at www.usek.edu.lb.

Week	Month	Date	Day	Specific Announcement
1	September	1	Monday	Start of Classes
2				
3				
4				
5				
6	October	6	Monday	Test 1
7				
8				
9				
10				
11				
12	November	10	Monday	Test 2
13				
14				
15	**Final Exams**			

VIII. Course Material

Required Texts	*Electronic Devices, Thomas L. Floyd.*

Supplemental References	
Required Materials	

IX. Course Grading System

Provide information about each assignment and assessment activity and specify their weight in the overall grade.

Students are requested to demonstrate and search for real-life problems related to the course content. These assignments' main goal is to encourage the students to pour personal efforts into their learning and to initiate their awareness of the course content in their daily lives. The weight of these assignments can vary between 5 to 10%. Two tests are done during the semester for an overall weight of 40 to 50%, according to the assignment's percentages.
The final exam has a weight of 40% and the active participation has a weight of 10%.
All evaluations cover the LOs of the course.

All course grades will be regularly shared with students, preferably on the e-learning platform.
The course final examinations date will be published by the Registrar Office in due time. No test or examination shall be given during the last two weeks before the regular examination period.

Passing grade

A minimum grade of 70 is required for this course.
The Grading policy can be found in the **Academic Rules and Regulations** published on the website.

Grading criteria

Grading Criteria (Total = 100%)	
10%	Attendance and active participation
0-10%	Homework, project, research paper, …
40%-50%	Quizzes, Tests, Midterm, …
40%	End of semester evaluation *(The final exam shall have the highest percentage of the grade)*

X. Course Policies and Support to students

The USEK **Academic Rules and Regulations** is the official document of record concerning academic programs and regulations. It can be found at www.usek.edu.lb .

Class attendance policy

Students can, for valid and justified reasons, be absent for a number of teaching hours equal to three teaching weeks (20% of the course's number of hours, i.e., 9 hours = 6 sessions of an hour and 15 minutes each). However, they are responsible for learning material covered in class and will fail all graded class activities (quizzes, tests, presentations, discussions, etc.) organized during these absences.

Students who exceed the authorized limit of absences will not be allowed to sit for their final exam. They must officially withdraw from the course before the official deadline, otherwise, they will be given the grade FW (Fail to Withdraw).

Students with an excused absence will be permitted to make up coursework or complete an equivalent assignment agreed upon with the instructor.

Absence to Mid-term and final exam

A student who does not show up for the Mid-term and final exams, for any reason, is given, by the teacher, a failing grade of zero. If this absence is due to special justifiable circumstances, such as:

- Death of a family member or relative.
- Hospitalization, attested by a medical report from the hospital.
- Tested positive to COVID-19, attested by a PCR test with a QR code.
- Serious accident, attested by an official report from a sworn expert.

Then the student can present a petition with supporting documents at the Student Affairs Office within the 24 hours following the missed exam. The request will be accepted for a valid justification or in case of a recurrence. A student who has shown up for the exam cannot, in any case, present a petition for a make-up exam.

The Mid-term and final exams policy can be found at www.usek.edu.lb .

Late Submission

Assignments are expected to be submitted by the designated deadlines. Late submissions may result in grade penalties unless prior arrangements have been made with the instructor.

Academic Integrity

Plagiarism and any form of academic dishonesty are strictly prohibited. All work submitted must be your own, unless otherwise specified.

Students are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will result in an academic penalty of the student failing the assignment and may result in additional disciplinary measures. This includes, but not limited to, improper citation of sources, using another student's work, and any other form of academic misrepresentation. Suspicions of use of artificial intelligence aids will be considered as alleged violations of Cheating.

The Academic Integrity policy can be found at www.usek.edu.lb .

Netiquette

Students are expected to communicate with each other and with the instructor in a learning community. They are expected to be respectful, polite, and knowledgeable during oral and written communication and when posting to the class discussion forums.

Course Evaluation Survey

Completion of the online course evaluation survey is required. Students will not be able to access their course grade until they have completed the course evaluation.

Arrangements for Students with Special Needs

USEK empowers students to manage challenges and limitations imposed by special needs. Students with disabilities are encouraged to contact the Access Office by sending an email to accessoffice@usek.edu.lb, for any accommodation needed to fulfill course requirements (within the first week of the semester).

Writing Center

The USEK Writing Center offers writing assistance to students. Its main mission is to develop their writing skills and provide free writing support for students of all levels and at any stage of the writing process by offering in-person consultations during which writers can brainstorm ideas, adopt different writing approaches and strategies, and receive feedback from a well-trained tutor. For assistance student are encouraged to contact the center by sending an email to writingcenter@usek.edu.lb.

Technical Support

The Enterprise and Information Technology Services (EITS) at USEK provides essential assistance to students for resolving technical issues and ensuring smooth access to digital resources. It offers guidance and troubleshooting for hardware and software problems, assists with network connectivity, and helps students navigate learning management systems and online platforms.

Latest Update on	Signature
01/09/2025	