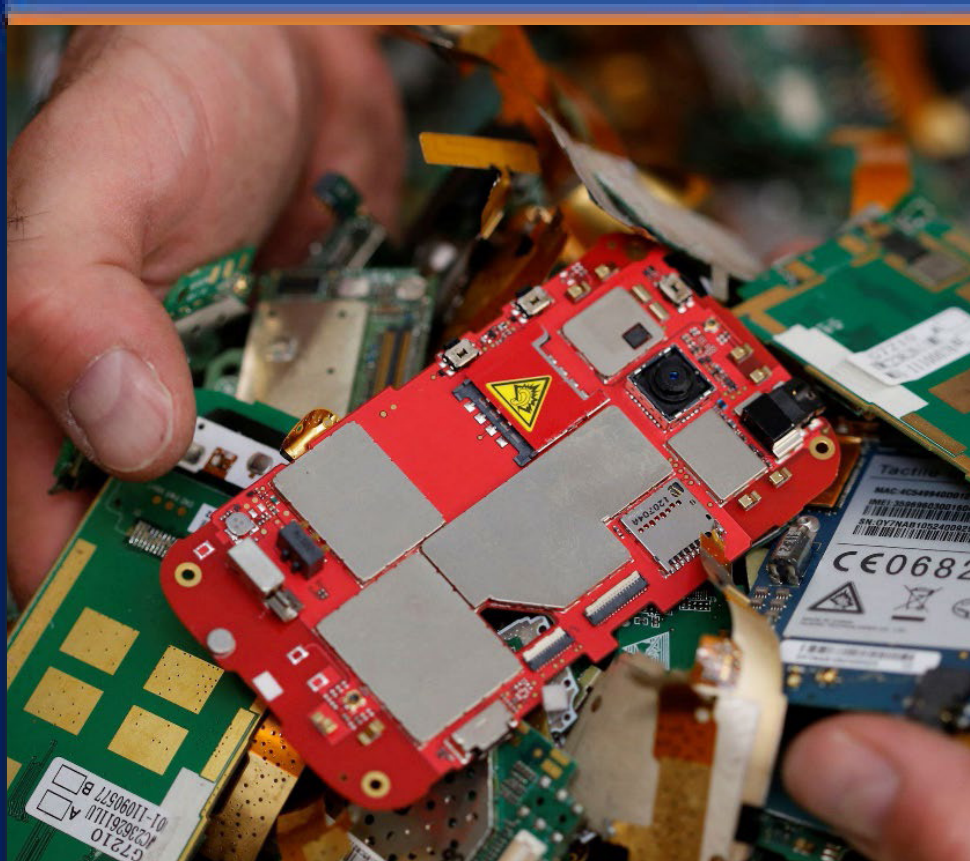




BMET 2306

Electronics 2



About Us

The College of Biomedical Equipment Technology (CBET) is a majority Veteran owned and operated private college offering Biomedical Equipment Technician (BMET), Healthcare Technology Management (HTM) and Healthcare Information Systems Management training at the certificate and associates degree levels. Our leadership team is comprised of individuals with decades of experience in the healthcare industry and education. Similarly, our instructional staff is comprised of industry experts and award-winning educators dedicated to providing quality education, training, and career services to our students.

Locations

Main Campus

105 Windy Meadows, Suites 201
Schertz, Texas 78154
www.cbet.edu

Mission

“The College of Biomedical Equipment Technology delivers premier education and training in Healthcare Technology Management and Information Technology to equip students to meet the evolving needs of the industries we serve.”

ABOUT THE COURSE

Electronics II is the second of a series of three courses devoted to teaching the basics of electrical theory, functions of electronic circuits, and practical applications for those circuits in the control of medical devices.

COURSE DESCRIPTION

The course is designed to strengthen the students understanding Semiconductor devices and Linear Electronics. This course introduces the theory, fabrication and testing of semiconductor devices. It continues by discussing different semiconductor devices such as diodes, transistors, and operational amplifiers. The latter portion of the course studies linear electronics where the student will study workings of power supplies, amplifiers, oscillators and other wave shaping circuits. While including topics such as diodes, bipolar junction transistors, transistor amplifiers, field effect transistors, thyristors, and operational amplifiers.

LEARNING OBJECTIVES

- LO1. Explain the construction and workings of a diode, including LEDs and Zener diodes.
- LO2. Describe how half-wave and full-wave rectifiers operate.
- LO3. Describe the construction of a transistor and different biasing techniques.
- LO4. Explain how transistors amplify voltage, current, or power.
- LO5. Describe the characteristics of the common-emitter, common-collector, and common-base amplifiers.
- LO6. Describe what a thyristor is and list its main applications.
- LO7. Describe the dc and ac characteristics of operational amplifiers.
- LO8. Identify various oscillator and other wave shaping circuits and their construction.
- LO9. Explain the laws of electromagnetism.

TIME-ON-TASK

Time on task is the total learning time spent by a student in this course, including instructional time and time spent studying and completing course assignments and other activities (e.g., reading, research, writing, individual and group projects.) These activities are:

- Attending the weekly webinars
- Reading course presentations/ “lectures”
- Reviewing course notes
- Reading assignment references, books, or other course materials
- Participation in online discussions
- Conducting research
- Writing papers or other assignments
- Completing other assignments (e.g., projects)

The entire course Time-on-Task is 118 hours.

Instructional Team

The Electronics I course is led via webinar and interactive distance learning formats. In addition to the weekly live sessions, the instructor is accessible via the Learning Management System (LMS) daily, and by appointment via Zoom between the hours of Monday through Friday from 0800-1700 (CST).



Mr. Manuel "Manny" Ortega retired after serving 20 years in the world's finest Navy. During his career he led maintenance teams over different platforms to include aviation as an Aviation Electrician/Flight Engineer and medical equipment as a Biomedical Equipment Technician. He worked in organizational, intermediate and depot level maintenance capacities. He performed as an instructor for 17 of his 20 years in and out of the classroom. He started off teaching Flight Engineers and Pilots normal and emergency procedures in flight and on the ground. He earned his Master Training Specialist certification while instructing at Naval Aviation Schools Command. He finished his career as a Community College of the Air Force (CCAF) Instructor at the DoD Biomedical Equipment Technician School where he taught Advanced Electronics 2. He

also developed and instructed a Medical Laser Systems course for the Advance Biomedical Equipment Program. Other teaching certifications that Mr. Ortega has are CCAF Instructor certifications at levels 1 and 2, as well as being NCCT Certified Post-Secondary Instructor. Mr. Ortega can be contacted directly through CANVAS messaging or via e-mail at mortega@cbet.edu, during office hours, Monday through Friday, 0800-1700 CST.

Instructional Methods and Activities

The student online learning environment is structured to mirror the course syllabus and includes all the information students require to successfully navigate the course. The online learning environment referred to as CANVAS, provides a means for students to engage, communicate, and learn. CBET instructors will actively engage students in CANVAS via discussion board forums and other activities designed to cultivate student engagement and participation.

Online Classes (Daily): Students are expected to engage in CANVAS. Courses include weekly assignments, quizzes, tests, and other requirements prescribed by the instructor. Students are responsible for completing weekly assignments in a timely manner as prescribed by the instructor(s). It is important to remember that in addition to the resulting grades, completion of weekly assignments is also used to measure student engagement, attendance, and participation.

Weekly Live Webinars Mandatory: Mandatory instructor led webinars will be conducted at least once per week (60 Minutes). Additionally, students may request one-on-one counseling or tutoring sessions based on the instructor's availability. Webinars are not optional; however, we understand that from time-to-time students may not be able to attend in person. If you cannot attend a live session, the webinars will be posted in CANVAS for review.

Online Discussion Forum (Daily/Weekly): CANVAS includes a discussion board with weekly prompts and instructions for completing daily/weekly assignments. Students are required to respond to all weekly discussion board topics and instructor-directed prompts. Responses must be substantive and meet the minimum word count requirement. Additionally, students are required to engage with peers by responding to no fewer than two student responses per week. Student participation and attendance in CANVAS is reported to the Director of Education on a weekly basis and the information is used, in part, to measure attendance and participation in the course.

Late/Make-up work: All assignments must be completed on time and as instructed to receive full credit. Make-up work shall:

1. Be supervised by an instructor approved for the subject being made up.
2. Require the student to demonstrate the same knowledge or competence expected of a student who attended the scheduled class session.
3. No more than 5% of the missed work can be made up. All work must be completed and submitted within seven (7) calendar days of its original due date. All coursework must be submitted no later than six (6) calendar days after the course ends.

WEEK 1/MODULE 1 (Semiconductor / Diodes)

Learning Objective 1: Understand how Semiconductors/ Diodes are constructed and function.	
TLO 1	Explain the concepts of Semiconductor Devices.
TLO 2	Explain the construction and workings of all diodes.

Module 1 Overview:

The first course module requires students to learn the construction and operation of diodes, transistors, FETs and MOSFETs and proper transistor biasing.

Week 1 Discussion Questions

Discussion Question (DQ) 1: Please take some time to introduce yourself and give a brief description of your electronics background (if applicable). If not just tell us a little about yourself and what you hope to gain from this course.

Discussion Question (DQ) 2: Semiconductors have been a revelation to the world of electronics. Select a semiconductor device, describe its function, and give examples of its uses in the real world (in the world of medical devices if possible). [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Module 1 webinar will include a course overview and instructions to improve the student's ability to access materials and resources. Additionally, the Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 1 Assignments

Assignment 1: The weekly assignment will 30 multiple choice, fill in the blank and true/false questions, based on the weeks reading and lecture topics.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Time-on-Task

The Time-on-Task for this module is 21 hours.

WEEK 2/MODULE 2 (Bipolar Transistors / FETs)

Learning Objective 2: Transistor Fundamentals	
TLO 1	Describe the construction of transistor and different biasing techniques.
TLO 2	Describe the construction of field effect transistors and different biasing techniques.

Module 2 Overview:

During week 2 students will learn about concepts of how bipolar transistors and field effect transistors are produced, operated, and tested.

Week 2 Discussion Questions

Discussion Question (DQ) 1: Transistors can be used as amplifiers, switches and oscillators. Describe an everyday device we use that may require each of these properties. Not necessarily all 3 in the same device. Use your book or Google skills and don't forget to cite your source. [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 2 Assignments

Assignment 1: The weekly assignment will 30 multiple choice, fill in the blank and true/false questions, based on the weeks reading and lecture topics.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Time-on-Task

The Time-on-Task for this module is 20 hours.

WEEK 3/MODULE 3 (Thyristors / Integrated Circuits)

Learning Objective 3: Understand operation of thyristors and integrated circuits.	
TLO 1	Describe what a thyristor is and list its main applications.

Module 3 Overview:

During module 3 students will learn about concepts of how thyristors are produced, operated, and tested, how integrated circuits are produced and operated and of light-sensitive and light emitting devices and how they are produced and operated.

Week 3 Discussion Questions

Discussion Question (DQ) 1: Think about what you use every day that would require the use of an amplifier circuit. Take into consider the Class of amplifier the device is using and the fidelity of the signal it produces. [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 3 Assignments

Assignment 1: The weekly assignment will 30 multiple choice, fill in the blank and true/false questions, based on the weeks reading and lecture topics.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Time-on-Task

The Time-on-Task for this module is 21 hours.

WEEK 4/MODULE 4 (Optoelectrical / Power Supplies)

Learning Objective 4: Describe how rectifiers and optoelectrical devices work.	
TLO 1	Explain the construction and workings of light sensitive and light emitting devices.
TLO 2	Describe how half-wave and full-wave rectifiers operate.

Module 4 Overview:

During module 4 students will learn about concepts of light-sensitive and light-emitting devices and how they are produced and operated. Also, how power supplies are constructed and operate.

Week 4 Discussion Questions

Discussion Question (DQ) 1: For this week's discussion, think about when binary, hexadecimal and octal numbers would best be used? Why, do we have to have different number systems? [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 4 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Assignment 3: The lab will require research, creation, and analysis of an advanced electrical circuit which will enhance the understanding of one or more of the course topics. In addition, Students will be required to submit both photographic and written portions to show their work. Soldering will be experienced by students for the first time during this lab, so the quality of the soldering, and functionality of the clock are not critical components of the evaluation.

Time-on-Task

The Time-on-Task for this module is 20 hours.

WEEK 5/MODULE 5 (AC Measurements, Resistive, and Capacitive Circuits)

Learning Objective 5: Learning Amplifier Configurations.	
TLO 1	Describe the characteristics of the common-emitter, common-collector, and common-base amplifiers.
TLO 2	Explain how transistors amplify voltage, current, or power.
TLO 3	Describe the dc and ac characteristics of operational amplifiers.

Module 5 Overview:

During module 5 students will learn concepts, types, and block diagrams associated with fabrication of an amplifier.

Week 5 Discussion Questions

Discussion Question (DQ) 1: List two applications for a Bipolar Junction Transistor and talk about one in detail. [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 5 Assignments

Assignment 1: The weekly assignment will 30 multiple choice, fill in the blank and true/false questions, based on the weeks reading and lecture topics.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Time-on-Task

The Time-on-Task for this module is 18 hours.

Note: Please remember to complete the end of course survey prior to the last day of class.

WEEK 6/MODULE 6 (Oscillators / Wave Shaping Circuits)

Learning Objective 6: Understand the operation and uses of wave shaping circuits.	
TLO 1	Identify various oscillator and other wave shaping circuits and their construction.

Module 6 Overview:

During module 6, Students will learn about the concepts, types, applications and block diagrams of oscillators and other wave shaping circuits.

Week 6 Discussion Questions

Discussion Question (DQ) 1: Describe what you liked from the class? What you didn't like? No replies to fellow students necessary. [Minimum 200-word response for full credit]

Discussion Question (DQ) 2: How do we figure out what our phase relationship in a series reactance and resistive circuit? Parallel? [Minimum 200-word response for full credit]

Webinar Session (60 Minutes): The Webinar's topics and discussions will be directed toward the weeks learning objectives.

Week 6 Assignments

Assignment 1: The weekly assignment will 30 multiple choice, fill in the blank and true/false questions, based on the weeks reading and lecture topics.

Assignment 2: Complete a weekly 100-point quiz based on the learning objectives of the week.

Time-on-Task

The Time-on-Task for this module is 18 hours.

Note: Please remember to complete the end of course survey prior to the last day of class.

Course Grade Distribution

Discussion Board Requirements	35%
Weekly Webinars and Assignments	35%
Weekly Quizzes	30%

Discussion Board Grading Criteria (35% of overall grade)

Students are required to respond to all weekly discussion board topics and instructor-directed prompts. Responses must be substantive and meet the minimum word count requirement. Additionally, students must engage with peers by responding to no fewer than two peer-to-peer responses per week. The following rubric is used as a guide by instructors to evaluate and grade student responses to discussion questions and peer-to-peer engagement:

	Beginning	Developing	Accomplished	Exemplary
	0-25 Points	25-50 Points	50-75 Points	75-100 Points
Weekly Discussion Question Responses (Minimum of two 200-word responses per week).	Contributes fewer than the required 2 Discussion Question (DQ) responses.	Contributes 2 Discussion Question (DQ) responses but one or both fail to meet minimum word-count requirements for the DQ.	Contributes by providing 2 Discussion Question (DQ) responses and meets the minimum word count requirements for the DQ.	Exceeds required DQ word count requirements and/or provides an exemplary response to a DQ.
Weekly Engagement with peers (Minimum of two 200-word responses to peers each week).	Contributes fewer than the required peer-to-peer responses in the discussion forum.	Contributes 2 peer-to-peer responses in the discussion forum but fails to meet minimum word-count requirements and lacks substance.	Contributes by providing 2 peer-to-peer responses and meets the minimum word count requirement for the peer-to-peer response.	Exceeds required peer-to-peer response requirements by meeting the minimum word count requirement and providing substantive responses to peers.
Quality and Content of DQ responses and peer-to-peer responses in the Discussion Forum.	Postings in the discussion forum are not relevant to the assigned topic, are inaccurate, or misrepresented.	Postings in the discussion forum address peripheral topics, are generally accurate, but may contain factual omissions and/or errors.	Postings are generally substantive; however, responses rely too heavily on opinion than fact. Postings meet word count requirements but lack scholarly tone or appropriate references.	Discussion Question and Peer-to-Peer postings consistently contribute to the discussion, contain substantive comments backed by relevant references and encourage open dialogue and additional discussion in the class.

Weekly Live Webinars and Assignments (35% of overall grade)

Mandatory instructor-led webinars will be conducted at least once per week (60 Minutes). Webinars are not optional; however, we understand that from time-to-time students may not be able to attend in person. If you cannot attend a live session, the webinars will be posted in CANVAS for review. Instructors will assign weekly assignments associated with the live webinars.

Weekly Quizzes (30%)

Students will be assigned homework on a weekly basis. Homework may consist of a wide variety of deliverables. Quizzes are assigned in weeks one, two, and five. Worksheets are assigned in weeks two and four. Homework may include a wide array of requirements, ranging from written assignments, research projects, Power-Point presentations, and a host of other activities. In all cases, instructors will endeavor to ensure that students possess a clear understanding of the requirements and expectations.

Grading System for the College of Biomedical Equipment Technology

A	90-100	4.0	F	59 & Below	0.0
B	80-89	3.0	W	Withdrawal	N/A
C	70-79	2.0	I	Incomplete	N/A
D	60-69	1.0	T	Transfer	N/A

To receive an incomplete “I”, the student must petition the instructor for an extension to complete the required coursework. The student must be able to pass the course with the completed work and garner a grade of 70 or better. Incomplete grades that are not completed within 7 business days after the beginning of the next session will be converted to the existing grade earned in the course and will affect the student’s GPA accordingly. CBET reserves the right to extend the time needed to fulfill the incomplete.

An “I” does not count towards the Grade Point Average (GPA) until a grade is assigned. A “W” is given when a student is dropped from the roster during the course and does not replace the previous grade(s). Grades of “W” and “F” are recorded in the academic transcript and reflected in the GPA. When a course is repeated after failure or withdrawal, the later grade will replace the first grade in calculating the CGPA. The clock hours of the course repetition are counted toward the maximum timeframe. CBET shall record a grade of “incomplete” for a student who withdraws but is not entitled to a refund if the student requests the grade at the time the student withdraws, and the student withdraws for an appropriate reason unrelated to the student’s academic status.

A student must repeat a course in which a grade of “F” was received. A student can repeat each course once, however, once they reach 1.5 times the length of time required for graduation, they will be dropped from the program. If a student fails any course a second time, he/she will be dropped from the program. A failed course will be rescheduled for the earliest possible module at the discretion of the Director of Education. Students will be charged to retake the course.

Additional Resources and Points of Contact

Students requiring additional administrative support are encouraged to contact the Colleges Student Advocate, Mrs. Terri Gomez, at 210.233.1102 or via e-mail at tgomez@cbet.edu

For a complete list of administrative policies and regulations refer to the CBET Catalog at <https://cbet.edu/course-catalog>

NOTE: THE INSTRUCTOR RESERVES THE RIGHT TO MODIFY THIS SYLLABUS and COURSE OUTLINE