Course Syllabus

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Basic Electricity AC & DC– ELT 101

3.0 Credits
Fall 2021 Semester Syllabus

Course Information

Instructor: Jeff DuFriend
Office: *Room 110 Building D
Office Hours: 12:00PM – 1:00PM Tuesday - Friday
Office Telephone: 928-649-5469
E-mail: jefferson.dufriend@yc.edu *(Please use your Yavapai student email for correspondence.*

Course Description

Class meets in building D room 112 Electrical Lab at Yavapai College, Verde Valley Campus, Clarkdale, AZ.

Meeting times:

Wednesday 5:00PM – 7:30PM

Friday 5:00PM – 7:30PM

Credits Hours: 3 credit hours (3 lecture, 2 lab)

Basic principles of Alternating Current (AC) and Direct Current (DC)electricity. Examination of the structures and functions of AC and DC circuits including series, parallel and series-parallel circuits. Includes an overview of electric systems and their applications in the electrical industry.

Required Text

- You are not required to purchase a text book for this course but there may be required reading

from various sources that I will make available to you. It is recommended that you purchase a 3 ring binder to collect valuable handouts that can be used for future reference. It is recommended that you purchase Basic Electronics, Bernard Grob (any edition).

Course Requirements

- **You will need a scientific calculator**
- During labs you will be required to wear the assigned PPE and follow all safety rules. There will be no exceptions! Hard toe shoes are not required but recommended. Closed toe shoes, however, are required to be worn in the classroom at all times. There will be no food in the classroom or labs unless it is part of a planned event and approved by instructor. Drinks are allowed only in spill proof containers. Cell phones not allowed out in class unless specifically asked to take them out for course relevant research. Please turn off ringers while in class.

Course Content & Learning Outcomes

1. Basic principles of electricity: the atom, electric current, conductors and insulators, uses in the utility industry
2. Electric circuits: pressure, power, energy, Ohm's Law
3. Building DC circuits
4. Electric systems: generating, transmission, substation and distribution systems

Upon successful completion of this course, the learner will be able to:

1. Describe the uses of AC/DC circuits in the utility industry. (1)
2. Analyze AC/DC circuits using Ohm's Law. (2)
3. Analyze series, parallel, and series-parallel circuits. (3)
4. Describe electric generating stations and sub-stations. (4)
5. Describe the major components and functions of electric distribution systems. (4)

Course Calendar Fall 2021

Week 1 8/18

Introduction and Syllabus

Unit 1: Intro to Electrical and Electronics Technology

➢ Electrical and electronics fields and industries

➢ Electrical and electronics programs at YC

➢ Lab/safety guidelines

Associated Learning Outcomes: 1

- TAKE Syllabus Quiz Due 8/20(THIS IS YOURFIRST ASSIGNMENT-- failure to complete this by8/20 will result in a withdraw)
- Unit power point lecture, ISCET ESA-1module on Electricity and Safety and ISCET ESA-2module on Troubleshooting & Measurements.
- COMPLETE Unit 1 Worksheet: Lab and Safety Guidelines
- TAKE Unit 1 exam (50 points possible)

Week 2 8/25

Unit 2: Atomic Theory and Math

➢ Atomic particles

➢ Laws of attraction/repulsion

➢ Directed drift

Associated Learning Outcomes: 1

- Unit powerpoint and ESA-1 modules on Metric and Scientific Notation, Atoms and Electrons,and The Electrical Charge.
- COMPLETE Unit 2 Worksheet: Atomic Theory
- PERFORM Lab 2-1: Introduction to the lab trainers
- TAKE Unit 2 exam (50 points possible)

Week 3 9/1

Unit 3: Voltage and Current

➢ Voltage and current defined

➢ Relationship between voltage and current

➢ Voltage and current units

Associated Learning Outcomes: 1,2

- Unit powerpoint and ESA-1 modules on Electrical Units, Voltage and Current.
- COMPLETE Unit 3 Worksheet: Voltage and Current
- PERFORM Lab 3-1: Using a DMM
- TAKE Unit 3 exam (50 points possible)

Week 4 9/8

Unit 4: Electrical Measurements

➢ Type of meters

➢ How to safely measure V, I, and R with a DMM

Associated Learning Outcomes: 1,2

- Unit powerpoint and ESA-1 modules on Electrical Components and Measurements, Electrical Units, and Basic Circuit Measurements.
- COMPLETE Unit 4 Worksheet: Electrical Measurements
- PERFORM Lab 4-1: Measuring voltage and current
- TAKE Unit 4 exam (50 points possible)

Week 5 9/15

Unit 5: Resistance and Power

➢ Resistance and power units

➢ Relationship between R and P

➢ Resistor color code and measurements

Associated Learning Outcomes: 1,2

- Unit power point and ESA-1 modules on Electrical Units, Resistance and Ohm's Law, Energy and Power
- COMPLETE Unit 5 Worksheet: Resistance and Power
- PERFORM Lab 5-1: Measuring resistance
- PERFORM Lab 5-2: The potentiometer
- TAKE Unit 5 exam (50 points possible)

Week 6 9/22

Unit 6: Ohm's Law

➢ Relationship between V, I, and R

➢ Ohm's Law calculations

Associated Learning Outcome: 2

- Unit powerpoint and ESA-1 module on Ohm's Law, Energy and Power.
- COMPLETE Unit 6 Worksheet: Ohm's Law
- PERFORM Lab 6-1: Ohm's Law
- TAKE Unit 6 exam (50 possible points)

Week 7 9/29

Unit 7: Series DC Circuits

➢ Concepts

➢ Calculations

➢ Troubleshooting Associated

Learning Outcomes: 2,3

- Unit power point and ESA-1 modules on The Electric Circuit, Series Circuits and Troubleshooting [slides 1-9 and 12-17 ONLY].
- COMPLETE Unit 7 Worksheet: Series DC Circuits
- PERFORM Lab 7-1: Series DC Circuits
- TAKE Unit 7 exam (50 points possible)

Week 8 10/6

Unit 8: Parallel DC Circuits

➢ Concepts

➢ Calculations

➢ Troubleshooting

Associated Learning Outcomes: 2,3

- Unit power point and ESA-1 modules on Series Circuits and Troubleshooting [slides 10-11 ONLY].
- COMPLETE Unit 8 Worksheet: Parallel DC Circuits
- PERFORM Lab 8-1: Parallel DC Circuits
- TAKE Unit 8 exam (50 points possible)

Week 9 10/13

Unit 9: Series-Parallel DC Circuits

➢ Concepts

➢ Calculations

➢ Troubleshooting

Associated Learning Outcomes: 2,3

- Unit power point and ESA-1 modules on Series-Parallel Circuits, and Troubleshooting [slides17-21 ONLY].
- COMPLETE Unit 9 Worksheet: Series-Parallel DC Circuits
- PERFORM Lab 9-1: Series-Parallel DC Circuits
- TAKE Unit 9 exam (50 points possible)

Week 10 10/20

Unit 10: Electromagnetism

➢ Magnetism and electromagnetism

➢ Electromagnetic devices

➢ DC and AC motors

Associated Learning Outcomes: 4,5

- Unit power point and ESA-2 modules on Electromagnetism, and Magnetic Devices.
- COMPLETE Unit 10 Worksheet: Electromagnetism
- PERFORM Lab 10-1: Safety-pin motor
- PERFORM Lab 10-2: Relays
- TAKE Unit 10 exam (50 points possible)

Week 11 10/27

Unit 11: Alternating Current

➢ How alternating current is generated

➢ AC transmission

Associated Learning Outcomes: 1,2, 4, 5

- Unit power point and ESA-2 modules on Alternating Current and Voltage, AC and Ohm's Law, and

Troubleshooting & Measurements [slides 34-39ONLY].

- COMPLETE Unit 11 Worksheet: Alternating current
- PERFORM Lab 11-1: Measuring AC voltage and frequency
- TAKE Unit 11 exam (50 points possible)

Week 12 11/3

Unit 12: Transformers

➢ Transformer theory

➢ Types of transformers

➢ Turns ratios

Associated Learning Outcomes: 1,4, 5

- Unit power point and ESA-2 modules on Transformers, and Troubleshooting & Measurements [slides 30-33 ONLY].
- COMPLETE Unit 12 Worksheet: Transformer calculations
- PERFORM Lab 12-1: Transformers
- TAKE Unit 12 exam (50 points possible)

Week 13 11/10

Unit 13: Inductance and Inductive Reactance

➢ Inductance

➢ Inductance in series / parallel

➢ Inductive reactance

Associated Learning Outcomes: 1,5

- Unit power point and ESA-2 modules on Inductors [do not focus on time constant sections: slides 12-17],and Inductors and AC [SKIP Inductors and Ohm’s Law: slides 7-9].

- COMPLETE Unit 13 Worksheet: Inductive circuits
- PERFORM Lab 13-1: Inductive circuits
- TAKE Unit 13 exam (50 points possible)

Week 14 11/17

Unit 14: Capacitance and Capacitive Reactance

➢ Capacitance

➢ Capacitance in series / parallel

➢ Capacitive reactance

Associated Learning Outcomes: 1,5

- Unit powerpoint and ESA-2 modules on Capacitors [do not focus on materials and composition sections],and Capacitors and AC [SKIP Capacitors and Ohm's Law: slides 14-15].
- COMPLETE Unit 14 Worksheet: Capacitive circuits
- PERFORM Lab 14-1: Capacitive circuits
- TAKE Unit 14 exam (50 points possible)

Week 15 11/24 (no class on 11/26 for Thanksgiving break)

Guest Speaker and Q&A

Week 16 12/1

Lab prep and lab final

Week 17 12/8

Final exam prep

Final exam on 12/10

Grading Policy

Methods of Evaluation

Worksheets: 280 points possible (14 @ 20 points each)

Unit exams: 700 points possible (14 @ 50 points possible each; percentage score equals number correct divided by total possible)

Lab experiments: 300 points possible (15 @ 20 points each)

Lab Final: 100 points possible (10 stations at 10 points each)

Final exam: 100 points possible (percentage score equals number correct divided by total possible) Weighted to 10% of final grade

Total points possible without final: 1380 (90% of final grade) A = 1242-1380 points (90%) B = 1104-1241 points (80%) C = 966-1103 points (70%) D = 828-965 points (60%) F = 827 or less

Makeup Exam Policy

Please see additional instructor information at the end of this syllabus.

Grading Timeframes

I will return graded assignments within 14 days after the scheduled due date. If you have questions regarding an assignment, contact me prior to the due date so your question can be answered in a timely manner.

A course completed with a grade of D, F or U does not fulfill the prerequisite requirement for another course and may not be applied to a degree or certificate requirement.

Institutional Policies and Instructor Procedures

Student Email: Yavapai College provides enrolled students with an official **username@scholar.yc.edu** are expected to check their Yavapai College email account as directed by their instructo

Attendance: Students are expected to attend and participate in all class meetings, laboratories, and f instructor's and College's attendance and participation requirements should be dropped/ record. The last date of attendance will need to be documented.

A student-initiated withdrawal deadline is established by the College. If a student has nc from the class after the deadline depending upon the instructor's withdrawal policy. If a s

Course Withdrawal: Faculty initiated withdrawals for non-attendance are in place for both the benefit of the c will withdraw them from their classes unless they have been in contact with faculty mem

Academic Calendar: **https://www.yc.edu/v6/registrar/calendar.html (https://nam02 data=04%7C01%7CAngie.Poland%40yc.edu%7C8c5c6234c7684aba512b08d913df842e%7C0 %3D%7C1000&sdata=0f9Ib1gWMzFOo3yPPreuWUQ%2BkSLnclc%2BLArFHm5E%2Fds%3D**

Academic Integrity: Honesty in academic work is a central element of the learning environment. It is expecte plagiarism, or other dishonest means are violations of the College's Student Code of Co

Definitions of plagiarism, cheating, and violation of copyright and penalties for violation a

Student Code of Conduct: All students need to be aware of and comply with the safety and operational protocols fc **/v6/college-police/covid-19/reentry/)** .

Respect for the rights of others and for the College and its property are fundamental exp allegations of student misconduct.

Students are expected to respond and write in a respectful, professional, and appropriat
Inappropriate language or objectionable material will not be tolerated and could result in

Civil Dialogue Statement:

Regardless of venue or delivery method, faculty must ensure and maintain an environment appropriate for higher education. To promote a positive educational experience, appropriate and civil communication is an expectation of all students. All communication must remain respectful. Language or behavior that is threatening, intimidating, harassing, defamatory, libelous, or obscene is unacceptable. Hate speech is prohibited. Failure to abide by these standards may result in disciplinary measures. Please see **policy 10.10 (https://www.yc.edu/v6/policies/docs/1000d/1010-public-access-expression.pdf)** for further detail.

Academic Complaint Form:

A student may appeal an academic or instructional decision by faculty if s/he deems the decision to be made in error. The appeal must be made in a timely manner in accordance with established procedures. (**www.yc.edu/academiccomplaints (http://www.yc.edu/academiccomplaints)**)

Acceptable Use:

Yavapai College technological equipment and resources must be used in accordance with the **Technology Resource Standards (5.27) (https://www.yc.edu/v6/policies/docs/500b/527techstandards.pdf)** , **Copyright Use (2.28) (https://www.yc.edu/v6/policies/docs/200hr/228-copyrightuse.pdf)** and **Peer-to-Peer (P2P) File Sharing (5.26) (https://www.yc.edu/v6/policies/docs/500b/526-p2p.pdf)** policies. Use of Yavapai College equipment and resources to illegally copy, download, access, print, or store copyrighted material or download pornographic material is strictly prohibited. For example, file swapping of copyrighted material, such as music or movies is strictly prohibited. Users found to violate this policy will have their privileges to use Yavapai College technological equipment and resources revoked. (**www.yc.edu/policies (http://www.yc.edu/policies)**)

Mobile Devices:

Yavapai College is committed to providing a quality learning environment. All cell phones and mobile devices must be placed in silent mode while in classrooms, computer labs, library, learning center, and testing areas. Cell phones must be used outside these facilities.

Smoking and Tobacco Use:

Yavapai College is committed to limiting exposure to the harmful effects of primary and secondary smoke to campus students, visitors, and employees. In order to reduce the harmful effects of tobacco use and to maintain a healthful working and learning environment, the College prohibits smoking, including vaping, on all campuses except in designated smoking areas as per the **Smoking & Tobacco Use Policy (10.09).** **(https://www.yc.edu/v6/policies/docs/1000d/1009-smoking.pdf)**

(**www.yc.edu/v6/policies/docs/1000d/1009-smoking.pdf** **(http://www.yc.edu/v6/policies/docs/1000d/1009-smoking.pdf)**)

Drug Free Environment:

Yavapai College's policy is to provide an environment free of drugs and alcohol. The use of illegal drugs and abuse of alcohol pose significant threats to health and can be detrimental to the physical, psychological, and social well-being of the user and the entire Yavapai College community, and is prohibited. Campus Safety will be notified if a student exhibits an impaired state in the classroom environment.

Title IX – Sexual Misconduct:

Yavapai College does not deny or limit any student or employee the ability to participate in or benefit from any program offered by the institution on the basis of sex or gender. Sexual harassment, which includes acts of sexual violence such as rape, sexual assault, sexual battery, sexual coercion, unwanted touching, dating/relationship violence and stalking, are forms of gender-based discrimination prohibited by Title IX.

The college encourages students and employees to report incidents of sexual misconduct as soon as possible to the Title IX Coordinator or to a Deputy Title IX Coordinator. Contact information for Coordinators can be found at **Sexual Misconduct Resources** **(https://www.yc.edu/v6/student-services/sexualmisconduct.html)** .

Disability Resources:	Disability Resources ensures qualified students with disabilities equal access and reasonable accommodations in all Yavapai College academic programs and activities. YC supports disability and accessibility awareness and promotes a welcoming environment to all. The Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973 prohibits discrimination on the basis of disability and requires Yavapai College to make reasonable accommodations for those otherwise qualified individuals with a disability who request accommodations. (**www.yc.edu/disabilityresources (http://www.yc.edu/disabilityresources)**) Yavapai College is committed to providing educational support services to students with documented disabilities. Accommodations for a student must be arranged by the student through Disability Resources by phone 928.776.2085 or email **disabilityresources@yc.edu (mailto:disabilityresources@yc.edu)** .
Faculty Response Time:	I will do my best to respond to emails, voicemails within 48 hours during the week.
Additional Instructor Information:	LATE WORK: Assigned work (worksheets, labs, and exams) will be accepted after the due date defined in the calendar only if prior notice is given of an absence to the instructor in advance of the class meeting (via e-mail or phone). In other words, if you miss class and don't let me know about it in advance you will not be allowed to make up any work that you missed. Note: All assignments including labs and worksheets are due the next class meeting.

Course Summary:

Date	Details	Due
Wed Aug 26, 2020	**Unit 1 exam (https://canvas.yc.edu/courses/30704**	due by 10am

Date	Details	Due
	/assignments/533915)	
Wed Sep 2, 2020	Unit 2 exam (https://canvas.yc.edu/courses/30704/assignments/533911)	due by 10am
	Lab 2-1 (https://canvas.yc.edu/courses/30704/assignments/533936)	due by 11:59pm
Wed Sep 9, 2020	Unit 3 exam (https://canvas.yc.edu/courses/30704/assignments/533920)	due by 10am
	Unit 3 Worksheet: Voltage and Current (https://canvas.yc.edu/courses/30704/assignments/533923)	due by 10am
	Lab 3-1 (https://canvas.yc.edu/courses/30704/assignments/533937)	due by 11:59pm
Wed Sep 16, 2020	Unit 4 exam (https://canvas.yc.edu/courses/30704/assignments/533922)	due by 10am
	Unit 4 Worksheet: Electrical Measurements (https://canvas.yc.edu/courses/30704/assignments/533900)	due by 10am
	Lab 4-1 (https://canvas.yc.edu/courses/30704/assignments/533938)	due by 11:59pm
Wed Sep 23, 2020	Unit 5 exam (https://canvas.yc.edu/courses/30704/assignments/533914)	due by 10am
	Unit 5 Worksheet: Resistance and Power (https://canvas.yc.edu/courses/30704/assignments/533907)	due by 10am
	Lab 5-1 (https://canvas.yc.edu/courses/30704/assignments/533939)	due by 11:59pm

Date	Details	Due
	Lab 5-2 (https://canvas.yc.edu/courses/30704/assignments/533940)	due by 11:59pm
Wed Sep 30, 2020	Unit 6 exam (https://canvas.yc.edu/courses/30704/assignments/533917)	due by 10am
	Unit 6 Worksheet: Ohm's Law (https://canvas.yc.edu/courses/30704/assignments/533918)	due by 10am
	Lab 6-1 (https://canvas.yc.edu/courses/30704/assignments/533941)	due by 11:59pm
Wed Oct 7, 2020	Unit 7 exam (https://canvas.yc.edu/courses/30704/assignments/533908)	due by 10am
	Unit 7 Worksheet: Series DC Circuits (https://canvas.yc.edu/courses/30704/assignments/533902)	due by 10am
	Lab 7-1 (https://canvas.yc.edu/courses/30704/assignments/533942)	due by 11:59pm
Wed Oct 14, 2020	Unit 8 exam (https://canvas.yc.edu/courses/30704/assignments/533903)	due by 10am
	Unit 8 Worksheet: Parallel DC Circuits (https://canvas.yc.edu/courses/30704/assignments/533912)	due by 10am
	Lab 8-1 (https://canvas.yc.edu/courses/30704/assignments/533943)	due by 11:59pm
Wed Oct 21, 2020	Unit 9 exam (https://canvas.yc.edu/courses/30704/assignments/533905)	due by 10am
	Unit 9 Worksheet: Series-Parallel DC Circuits	due by 10am

Date	Details	Due
	(https://canvas.yc.edu/courses/30704/assignments/533928)	
	Lab 9-1 (https://canvas.yc.edu/courses/30704/assignments/533944)	due by 11:59pm
Wed Oct 28, 2020	Unit 10 exam (https://canvas.yc.edu/courses/30704/assignments/533910)	due by 10am
	Unit 10 Worksheet: Magnetism and Electromagnetism (https://canvas.yc.edu/courses/30704/assignments/533906)	due by 10am
	Lab 10-1 (https://canvas.yc.edu/courses/30704/assignments/533930)	due by 11:59pm
	Lab 10-2 (https://canvas.yc.edu/courses/30704/assignments/533931)	due by 11:59pm
Wed Nov 4, 2020	Unit 11 Exam (https://canvas.yc.edu/courses/30704/assignments/533927)	due by 10am
	Unit 11 Worksheet: Alternating Current (https://canvas.yc.edu/courses/30704/assignments/533925)	due by 10am
	Lab 11-1 (https://canvas.yc.edu/courses/30704/assignments/533932)	due by 11:59pm
Wed Nov 18, 2020	Unit 12 Exam (https://canvas.yc.edu/courses/30704/assignments/533926)	due by 10am
	Unit 12 Worksheet: Transformers (https://canvas.yc.edu/courses/30704/assignments/533913)	due by 10am

Date	Details	Due
	Lab 12-1 (https://canvas.yc.edu/courses/30704/assignments/533933)	due by 11:59pm
Wed Dec 2, 2020	Unit 13 Worksheet: Inductance and Inductive Reactance (https://canvas.yc.edu/courses/30704/assignments/533901)	due by 10am
	Units 13 Exam (https://canvas.yc.edu/courses/30704/assignments/533904)	due by 10am
	Lab 13-1 (https://canvas.yc.edu/courses/30704/assignments/533934)	due by 11:59pm
Wed Dec 9, 2020	Unit 14 Exam (https://canvas.yc.edu/courses/30704/assignments/533919)	due by 10am
	Unit 14 Worksheet: Capacitance and Capacitive Reactance (https://canvas.yc.edu/courses/30704/assignments/533921)	due by 10am
	Lab final (https://canvas.yc.edu/courses/30704/assignments/533945)	due by 12:05pm
	Lab 14-1 (https://canvas.yc.edu/courses/30704/assignments/533935)	due by 11:59pm
Fri Dec 11, 2020	Final Exam (https://canvas.yc.edu/courses/30704/assignments/533899)	due by 5pm
	Lab Final - Online (https://canvas.yc.edu/courses/30704/assignments/533909)	due by 5pm
Wed Sep 1, 2021	Unit 1 Worksheet: Lab and Safety Guidelines (https://canvas.yc.edu/courses/30704/assignments/533929)	due by 11:59pm

Date	Details	Due
	Unit 1 Exam (https://canvas.yc.edu/courses/30704/assignments/542070)	due by 11:59pm
Thu Sep 2, 2021	Syllabus Agreement Fall 2021 (https://canvas.yc.edu/courses/30704/assignments/541070)	due by 11:59pm
Fri Sep 3, 2021	Unit 2 Worksheet: Atomic Theory and Math (https://canvas.yc.edu/courses/30704/assignments/533924)	due by 11:59pm
Sun Sep 19, 2021	Unit 2 Worksheet: Atomic Theory and Math (https://canvas.yc.edu/courses/30704/assignments/533924) (1 student)	due by 11:59pm
	Roll Call Attendance (https://canvas.yc.edu/courses/30704/assignments/538218)	
	Unit 1 exam (https://canvas.yc.edu/courses/30704/assignments/541005)	
	Unit 2 exam (https://canvas.yc.edu/courses/30704/assignments/541006)	