



Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: <https://catalog.uvu.edu/>

Semester: Fall

Course Prefix: AET

Course Title: Electrical Motor Control

Year: 2025

Course and Section #: AET-1280-601

Credits: 4

Course Description

Covers installation, troubleshooting, preventive maintenance, and theory on DC/AC motors, generators, and associated industrial control circuitry. Expands on ladder logic, controls, sensors, motor starters, overloads, and electronic devices used to control and protect DC/AC Machines. Describes three phase systems, transformers, and delta-wye connections. Introduces AC variable speed drives. Supports hands-on labs and projects

Course Attributes

This course has the following attributes:

- ☐ General Education Requirements
- ☐ Global/Intercultural Graduation Requirements
- ☐ Writing Enriched Graduation Requirements
- ☒ Discipline Core Requirements in Program
- ☐ Elective Core Requirements in Program
- ☐ Open Elective

Other: *Click here to enter text.*

Instructor Information

Instructor Name: Tim Hakala

Student Learning Outcomes

1. Analyze the operation of DC and AC motors.
 2. Describe DC and AC Motors and their associated control circuitry.
 3. Create operationally correct logic and ladder diagrams.
 4. Use sensing devices, timers, relays, solenoids, and starters to design industrial control circuitry.
 5. Troubleshoot electrical motor control circuitry.
 6. Analyze three phase electrical and transformer connections.
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Course Materials and Texts

Electrical Motor Control for Integrated Systems Workbook 5th Edition

Electrical Motor Control for Integrated Systems Text 5th Edition

Course Requirements

Course Assignments, Assessments, and Grading Policy

- Homework: Weekly practice problems related to topics under study. (20% of overall grade)
- Attendance: Attendance is very important, there are discussions in class and on the board (20% of overall grade)
- Exams: Eleven unit exams that are similar to problems from homework or discussed in class. Exams are open book, open notes, and taken in class. (20% of overall grade)
- Final Exam: A comprehensive exam that covers all course topics. (30% of overall grade)

A = 95-100	B - = 80-82	D+ = 67-69
A - = 90-94	C+ = 77-79	D = 63-66
B+ = 87-89	C = 73-76	D- = 60-62
B = 83-86	C - = 70-72	F = 0-59

Required or Recommended Reading Assignments

All required readings use chapters from the course text that align with the lectures below.

General Description of the Subject Matter of Each Lecture or Discussion

Chapter 8: Direct-Current Motors – (Adams Book)

A DC motor is a machine that converts electric energy to mechanical energy.

Chapter 11: Direct Current Motor Controls – (Adams Book)

On a constant voltage system, control is provided for each individual motor operating on a constant-voltage line.

Chapter 14: Transformers – (Adams Book)

The transformer has led to alternating – current systems replacing direct -current systems for most residential, commercial, and industrial applications.

Chapter 2: Symbols and Diagrams

Identify the differences between pictorial drawings, wiring diagrams, schematic, line, block, and flow charts.

Chapter 5: Control Logic

Before a load turns ON, there must be a control circuit that determines just how, when, and what environment and operating conditions must occur for that to happen.

Chapter 6: Mechanical Input control Devices

Industrial Pushbuttons, Selector Switches, Temperature Switches, Flow Switches, preventing problems when installing control devices.

Chapter 7: Electromagnets, Solenoids

Solenoids are the devices used to convert electrical energy into a linear mechanical force.

Chapter 8: Electro-mechanical Relays

Relays amplify small voltage input results in large output.

Chapter 9: DC Generators

DC generators consist of field windings, armature, a commutator and brushes.

Chapter 10: AC Generator

AC generators consist of field windings, an armature(coil), slip rings and brushes.

Chapter 11: Transformer

Transformers are used to increase voltage to high levels for transmission across the country and then decrease to a low level for use by electrical loads.

Chapter 12: Contactors and Magnetic Motors Starters

Motor starters are used to control and provide running protection for motors.

Chapter 13: DC Motor operation

DC motors consist of field windings, an armature, commutator, and brushes that makes contact with the successive copper bars of the commutator as the shaft, armature, and commutator rotate.

Chapter 14: AC Motors

Alternating current (AC) motors are the most common type of motor used to produce work

Chapter 15: Reversing Motors

Some motor applications require the motor to operate in only one direction and other applications require the motor to be reversible.

Chapter 16: Timing and Counting Functions

Time-and count-controlled events are electronically controlled by timers and counters.

Chapter 19: Reduced Voltage Starting Circuits

Reduced voltage starting reduces the amount of current a motor draws on when starting.

Chapter 21: Semiconductor Input Devices

Semiconductor input devices are often referred to as transducers.

Chapter 26: Motor Drives

motor drives can turn a motor on and off and provide overload protection from high operating currents.

Chapter 28: Power Distribution and Smart Grid Systems

Power distribution system operates, problems that may occur along the system, how measurements are taken.

Chapter 30: Predictive Maintenance

The understanding of electrical theory, components, and circuits

Required Course Syllabus Statements

Generative AI

Potential employers will eventually expect employees to know how to use tools like ChatGPT to generate content, code, and data. You should learn how to use artificial intelligence (AI) and in what instances AI can be helpful to you. Remember, AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts you must develop over time to develop your own voice.

The use of generative AI tools (e.g., ChatGPT, Google Bard, etc.) is permitted in courses for the following activities:

- Brainstorming and refining your ideas.
- Fine-tuning your research questions; don't accept anything AI generates at face value without checking it critically.
- Finding *accurate* information on your topic.
- Drafting an outline to organize your thoughts.
- Checking grammar and style.

The use of generative AI tools is not permitted in this course for the following activities:

- Impersonating you in classroom contexts, such as by using the tool to compose discussion board prompts/responses assigned to you or content that you put into a Teams/Canvas chat.
- Completing group work that your group has assigned to you unless it is mutually agreed upon that you may utilize the tool.
- Writing entire sentences, paragraphs, or papers to complete class assignments.

You are responsible for the information you submit based on an AI query (for instance, that it does not violate intellectual property laws or contains misinformation or unethical content). Your use of AI tools must be [appropriately documented](#) and cited to stay within university policies on academic honesty.

Any student work submitted using AI tools should clearly indicate what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. If any part of this is confusing or uncertain, please get in touch with the course instructor for a conversation before submitting your work. Additional university resources regarding the use of AI are available through the [UVU Office of Teaching and Learning](#).

Using Remote Testing Software

☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the

student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU [Accessibility Services](#) at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their [rights and responsibilities](#). In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in [UVU Policy 541: Student Code of Conduct](#).

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a [specially dedicated space](#) for meditation, prayer, reflection, or other forms of religious expression.