7South Dakota School of Mines & Technology
Energy Systems Lab
Fall 2026
EE 330L-M51 & -M52 1 credit

Instructor Information

Instructor's Name- Thomas Montoya

Instructor's Contact Information- (605) 394-1219, Thomas.Montoya@sdsmt.edu, EEP 314

Office Hours- 2-4 pm MWF, or when available (open door policy). No appointments.

As I do not always notice voicemails in a timely fashion, e-mails or in-person are the preferred contact methods. Unless I am traveling or it arrives after 5 pm, I typically respond to e-mails the same day.

Course Information

Course Start/End Dates- 8/24/2026 to 12/16/2026

Course Final Exam Date and Time- n/a

Course Meeting Times and Location- Th from 1-2:50 pm (-M51) & 3-4:50 pm (-M52) in EEP 307B are the posted times. Reality- we have three LabVolt systems/stations that can each accommodate up to three students. So, we will have additional lab times, most likely on Tuesdays (avoid EE 320L).

Course Delivery Method- The course will be delivered in-person for labs. D2L and/or my webpage http://montoya.sdsmt.edu will be used for course materials. E-mail will be used to notify students of course-related information/events (**check daily**) using your first.last@Mines.sdsmt.edu address.

Course Description- Laboratory to accompany EE 330.

Course Corequisites- EE 330.

Student Learning Outcomes

Student Outcomes (SOs)

Student Outcomes are defined in ABET's accreditation standards for engineering programs:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Course Learning Outcomes (CLOs)

Upon completion of this course, students should demonstrate the ability to:

A. Use meters, data acquisition tools, and LabVolt systems to collect, process, and interpret experimental data. (SO 6)

B. Measure, model, and interpret single-phase and three-phase circuit behavior and parameters under different loading and connection conditions including power factor correction. (SO 1, 6)

C. Measure, model, and interpret single-phase and three-phase transformer behavior and parameters under different loading and connection conditions. (SO 1, 6)

D. Analyze and measure current, voltage, and power characteristics of transmission lines under different loading conditions including power factor correction. (SO 1, 6)

E. Operate, analyze, and take measurements on electrical machines (e.g., induction motors) to determine their characteristics and performance. (SO 1, 6)

F. Design, investigate, and analyze three-phase power system. (SO 1, 2, 6)

G. Properly document and report results of experimental/laboratory work. (SO 3, 5, 6)

Course Goals

A goal of this course is to introduce students to the power engineering field before taking EE 431/531 Power Systems and/or EE 432/532 Power Electronics. Further, students are expected to be able to follow electrical safety standards and proper operating procedures when working with high-power systems, relate experimental results to theoretical concepts of energy systems, and understand the fundamental operation of the power systems and their components by the end of this course.

Course Topics

See attached schedule (subject to revision).

Course Materials

Required Textbook(s) and Materials

S. J. Chapman, *Electric Machinery and Power System Fundamentals*, McGraw-Hill Higher Education, 2002, ISBN-13 978-0-07-229135-3, ISBN-10 0-07-229135-4.

Technology Equipment and Skills Needed for the Course

The course requires use of a laptop computer and a scientific calculator (capable of complex number operations) as well as LabVolt system. Ability to LVDAC-EMS software, use navigate D2L and internet, upload/download files (e.g., pdf files), use MS-Office programs, communicating via email, and possibly connecting computer audio/video and using tools such as Zoom. MATLAB and/or MathCad may be used/useful for some assignments.

Course Grading

Coursework

- Course instruction will be delivered during laboratories.
- Labs will be done in groups of 2-3 students (TBD based on class size). No groups of 4 or more without prior permission from instructor.
- Bring lab assignment, calculator, and computer to every lab. Logbook, class notes, text, straight edge, and USB drive are recommended.
- Logbook(s) are strongly recommended for labs. They are an invaluable reference for recording information on what occurred and was measured during the lab. This is useful for composing lab reports. The following guidelines are typical for logbooks:

(a) Laboratory work should be recorded in ink (black/blue) in a bound logbook (one per group minimum). Spiral notebooks or 3-ring binders are not recommended.

(b) Use the front side of pages only for the sake of legibility.

(c) Mistakes should be neatly crossed out (i.e., don't scribble out, white out, etcetera)

(d) On cover, put a label with: **EE 330L Energy Systems**, **Fall 202x**, and **your name(s)**. Optional- it is a good idea to put contact information on the cover or inside the front cover in case you misplace the logbook.

(e) Make a **Table of Contents** (TOC) on the first page- include lab number (if applicable), description/title, date(s), and page(s) (both start and finish).

(f) **Every page** in logbook should be numbered (prefer top right-hand corner) whether used or not. You may start numbering on or after the TOC (can use roman numerals for TOC).

(g) Start each lab by attaching/inserting the lab assignment in the logbook (if applicable).

(h) Record all work in the logbook. For repetitive calculations, a single sample is sufficient.

(i) The goal is that another person would be able to duplicate the lab work without outside references. For example, information such as partner(s) present, equipment list (include description, model #s, & brand), dates, block/circuit diagrams of test set-up, filenames, ... should be included, as applicable. A running commentary as well as comments, and conclusions are valuable in meeting this goal.

(j) Leave space (e.g., 1/2") between consecutive parts of a lab, don't cram/squish entries together. Work in a single column, **DO NOT** 'checker board.'

(k) Writing/diagrams/figures/graphs/pictures/plots/tables should be legible (e.g., size and neatness).

(l) Diagrams/figures/pictures/plots/graphs should be captioned (number & title) at bottom. Tables should also be captioned at top. These items may be done using computer software, formatted to fit logbook pages, and affixed (pasted or taped) on pages in the logbook as they occur (leave room). The bottom should be oriented toward the bottom or right-hand side of the page. Do **NOT** make readers 'hunt down' or search for items inserted out of order.

(m) Do **NOT** insert loose material in logbook or attach multiple inserted pages to a single logbook page, i.e., one insert page per logbook page.

(n) Use notation and conventional engineering units & prefixes (i.e., MKS) as given in class and text. Entries with incorrect notation and/or incorrect/missing units are incomplete/incorrect.

(o) Answers/measurments should be boxed/double underlined or in table(s), in **decimal format** (if numeric), and the variables, values & units (if any) included.

- To facilitate grading, laboratory reports should meet the following guidelines:

(a) Reports should be **single-sided**, entirely word-processed documents with pages numbered on plain white paper using professional fonts of size 12+ points with line spacing ≥ 1.1. They should be stapled in upper left corner - no paper clips, folded corners, or folders. After cover page, each page should be numbered using 'page *x* of *y*' or '*x*/*y*' formats (top right-hand corner).

(b) Standard report sections include: 1) cover page (lab number & title, course number & name, names of group members), 2) Introduction/Objectives, 3) body broken down into subsections based on the steps in lab (should include equipment list table), 4) Summary & Conclusions, 5) Contributions table (name of each group member in first column, contributions in second column), 6) references in IEEE format (if necessary), and 7) appendices (if necessary).

(c) A report tells the 'story' of the lab with text supplemented by relevant measurements and diagrams/figures/graphs/pictures/plots/tables that **are referenced** in the text.

(d) Unless otherwise specified, put calculations, results, and any diagrams/figures/graphs/pictures/plots/tables in the **body** of the report in the order specified or

as they occur. Appendices are **NOT** to be used as a "dumping ground" for data and figures. However, longer mathematical derivations and code/m-files may be attached as Appendices **if referenced** in the body of the report.

(e) All diagrams/figures/graphs/pictures/plots/tables should be **captioned** to allow easy reference.

(f) Numerical measurements/results that are specifically requested should be put on separate line(s) or table(s), not 'buried' in the middle of a paragraph.

(g) To follow technical writing practice, diagrams/figures/graphs/pictures/plots/tables should span width/height of page and face either the bottom or right of page with legible text.

(h) On generated graphs/plots, label horizontal and vertical axes, and insert a horizontal axis at 0. If a graph/plot contains more than one trace, use different line colors/types and a legend to clearly identify each trace.

(i) For all code/m-files, put filename, EE 330L, Lab #, your name(s), and date in comment lines.

Attendance Policy

Excused absences will be handled in accordance with South Dakota Mines Policy 3-1. Attendance is required for **all** students, i.e., an individual will not get credit for a lab that they miss even if their usual partners attend and complete the lab.

Late/Make-up Assignment Policy

- Late lab assignments will be assessed a penalty of up to 10% a day.
- Make-ups for labs only allowed for excused absences.

Academic Integrity

South Dakota Mines is committed to academic honesty and scholarly integrity. The South Dakota Board of Regents (BOR) Policy 2.9.2 provides a comprehensive definition of "Academic Dishonesty", which include cheating and plagiarism. All Instructors at South Dakota Mines are required to report allegations of academic misconduct to the Student Conduct Officer. BOR Policy 3.4.1 provides detailed information regarding key definitions, policy information, prohibited conduct, and the Student Conduct process adhered to at South Dakota Mines. Any student suspected of violating academic integrity standards will be reported in accordance with the process outlined on the South Dakota Mines website.

- Lab partners are expected to work together. Further, students are encouraged to discuss laboratory assignments/equipment with classmates in general terms. However, direct copying/plagiarism … is not acceptable and will be penalized (e.g., grade of zero).

Grading and Assessment

Student learning is assessed by a combination of in-person exams and quizzes as well as homework.

Description	Percent
Lab assignments/reports (simple average)	100%

Special Note Regarding Final Exams: Per South Dakota Mines Policy (2-8), if you are scheduled to take three or more final/last exams on the same day during finals week, you may request that the middle exam(s) of the day be rescheduled. ***You are required to make this request of your Instructor(s) at least 30 days prior to the last day of regular classes***.

Grading Scale- 100 > A > 90, 89 > B > 80, 79 > C > 70, 69 > D > 60, F < 60.

Academic Freedom Statement

Academic Freedom is the cornerstone upon which higher education is built. Academic freedom, as defined by BOR Policy 1.6.1, is fundamental to the advancement of truth, development of critical thinking, promotion of civil discourse, and contribution to the public good. Each course includes the freedom to discuss relevant matters and present various scholarly views in the classroom, as determined by the subject-matter expertise of the instructor. Students are encouraged to develop the capacity for critical thinking and to pursue the truth, debate ideas, express and evaluate their opinions, and draw conclusions. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.[1]

[1] *Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".*

Complaint Process

While we hope that every student has a meaningful and positive experience at South Dakota Mines, should a concern arise, students are encouraged to first attempt to resolve their concern directly with the person or office directly involved. Following that attempt, should the concern remain unresolved, students are encouraged to reach out to the Dean of Students office at DeanOfStudents@sdsmt.edu or 605.394.2416. Additionally, students may access the online form to submit their complaint, appeal, or grievance.

Grade Appeal Policy

In alignment with BOR Policy 2.9.1,and SDSMT Policy 2-21, students who wish to appeal their final course grade shall first discuss the matter with the course instructor. If the concerns are unresolved following that discussion, students may appeal to the instructor's department head or supervisor for a decision. If the student is dissatisfied with the supervisor decision, the student may then utilize the online form to submit "Appeal – Academic" for a "Grade Dispute".

Opportunity for All - Student Success Services and Support

Students are provided a one-stop source for information regarding all the services and supports to ensure success. Visit the Opportunity Center page to learn more.

Accessibility Accommodations

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Accessibility Services office at 605.394.2533 or DisabilityServices@sdsmt.edu as early as possible in the semester.

South Dakota Board of Regents Required Syllabus Statements

The following statements may be found online in South Dakota Board of Regents Academic Affairs Council Guideline 2.7.3.A(1):

- Freedom in Learning
- Americans with Disabilities Act
- Academic Dishonesty and Misconduct
- Acceptable Use of Technology
- Emergency Alert Communications

Electronic Devices Policy

Please silence/turn off your cell phone before lab starts. No text messaging or headphones in the laboratory.

Generative Artificial Intelligence Tool Utilization

To fully support the development of your independent thinking and creativity in this course, the use of generative Artificial Intelligence (genAI) tools is only allowed on the specific assignments and other course-related work expressly identified by the instructor. In instances where you are not specifically told it is acceptable to use a genAI tool, embrace the challenges of learning, scholarship, and personal growth and complete the assignment without the support of a genAI tool.

It is important to be aware of the risks of utilizing genAI tools in courses:

- Data privacy: genAI tools collect and store a significant amount of personal data from students. This raises concerns about how this data is used and protected, as well as the potential for misuse or unauthorized access. When you copy your own work into the genAI tool, keep in mind that your work no longer belongs to you, and it can be used in the genAI tool's learning.
- Bias in algorithms: genAI tools may be trained on bias data sets, which will then result in the algorithm reproducing that bias in the responses.
- Feedback loop inaccuracies: genAI models rely on feedback to improve their accuracy over time. If the feedback provided by students or instructors is incorrect, the genAI model may make inaccurate predictions based on faulty information.
- Hallucinations: Artificial intelligence systems may generate erroneous or misleading information that is not based on real data or patterns.
- Lack of transparency: The AI algorithm and decision-making processes are often complex and opaque, making it difficult for students to understand how their interactions with the genAI tool are being evaluated and assessed.
- Lack of training data: AI models require large amounts of high-quality training data to learn and make accurate predictions. If the training data used to build the AI model is incomplete or biased, the model may not be able to accurately predict answers.
- Limited context awareness: genAI tools lack the ability to understand the full context of an assignment, which can lead to inaccurate recommendations, responses, or assessments.

Topics/Course Schedule: See attached tentative schedule (subject to revision).

Tentative Course/Lab Schedule (subject to revision)

Lab | Dates	Topics/Activities
0 | 8/25/26 & 8/27/26	**Set lab sections & Introduction to LabVolt Software (student software download)**
1 | 9/1/26 & 9/3/26	**Introduction to LabVolt Software (in-person)**
2 | 9/8/26 & 9/10/26	**Introduction to LabVolt Hardware**
9/15/26	**career fair (Tuesday in King Center from 11 am -5pm)**
3 | 9/22/26 & 9/24/26	**Single-Phase Loads and PF Correction**
4 | 9/29/26 & 10/1/26	**Three-Phase Loads**
5 | 10/6/26 &/or 10/8/26	**Single-Phase Transformers**
n/a | 10/13/26 & 10/15/26	**Open***
6 | 10/20/26 & 10/22/26	**Three-Phase Transformers**
n/a | 10/27/26 & 10/29/26	**Open***
7 | 11/3/26 &/or 11/5/26	**Induction Motors**
8 | 11/10/26 & 11/12/26	**Transmission Lines**
9 | 11/17/26 & 11/19/26	**Mini Three-Phase Power System**
11/25 - 11/27	**Holiday**
9 | 12/1/26 & 12/3/26	**Mini Three-Phase Power System**

* Open weeks available for activities/tours (e.g., Substation, DC Tie Substation) or TBD labs