

**Electricity and Electronic Applications – ASM 354**  
**Agricultural Systems Management**  
**Class #2347**

Fall, 2020

**Lecture:** 9:00 – 9:50 am., M & W (ABEN 208)

**Laboratory:** 2:00 – 4:50 pm, T (ABEN 210)

3 credits

Elton Solseng

ABEN 105

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**Office hours:** 10:00-12:00 am, M-W (ABEN 106)

**Title:** Electricity and Electronic Applications

**PreReq:** Math 103 or 104 or higher.

**Text:**

- Fundamentals of Electricity in Agriculture, Gustafson and Morgan, 3<sup>rd</sup> edition 2004, and
- Agricultural Wiring Handbook, 16<sup>th</sup> edition

**Course Objectives:**

Students are expected to develop an understanding of:

- 1) Basic electrical principals
- 2) Basic electrical wiring
- 3) Acquainted with power distribution
- 4) Plan an electrical system for farmstead
- 5) Understand motors, controls, lighting, and solid state electronics, and
- 6) Basics of solar and wind power
- 7) Work with the national electric codes.

**Modes of Presentation:**

Lecture with Power Point

Guest Speakers (possible)

Problem solving/demonstrations

**Ref:**

- Gerrish, H. H., W. E. Dugger, and R. M. Roberts. 2009. Electricity and Electronics, 10<sup>th</sup> Edition,

**BLACKBOARD:** Blackboard will be used for announcements, class presentations, and temporary grade presentation

Tentative Lecture Schedule (Subject to change):

| Date     | Topic                                  | Chapter & Section |     | Problems                    |
|----------|--|-------------------|-----|-----------------------------|
|          |  | FEA               | AWH |                             |
| Aug. 25  | Introduction Preface                   |                   |     |                             |
| Aug. 30  | Basic terms and definitions            | 1                 |     | 3,4,5,6,7,8,<br>10,14,15,17 |
| Sept. 1  | Basic terms and definitions            | 1                 |     |                             |
| Sept. 6  | Holiday- Labor Day                     | 2                 |     | 3(a,b,d,e) 5,8              |
| Sept. 8  | Resistive Networks                     | 2                 |     |                             |
| Sept. 13 | Inductance Capacitance Phase relations | 3                 |     | 1,8,10                      |
| Sept. 15 | Inductance Capacitance Phase relations | 3                 |     |                             |
| Sept. 20 | Test                                   |                   |     |                             |

|          |   |         |  |                             |
|----------|---|---------|--|-----------------------------|
| Sept. 22 | Power generation and distribution                       | 4       |  | 1,3,4,9                     |
| Sept. 27 | Planning the electrical distribution systems            | 5       | 16,18,19,20,<br>21,22,23,24,<br>30,31,32 | 1,3,4,5,6                   |
| Sept. 29 | Planning the electrical distribution systems            | 5       |  |                             |
| Oct. 4   | Planning the residential electrical distribution system | 6       | 18,21,22                                 | 2,4,5,6                     |
| Oct. 6   | Planning the residential electrical distribution system | 6       |  |                             |
| Oct. 11  | Direct electrical controls and devices                  | 7       | 18,21,22                                 | 1,2,4,6,7                   |
| Oct. 13  | Direct electrical controls and devices                  | 7       |  |                             |
| Oct. 18  | Test  |         |  |                             |
| Oct. 20  | Electric Motors   | 8       | 25,26,27                                 | 1,2,3,9,10                  |
| Oct. 25  | Electric Motors   | 8       |  |                             |
| Oct. 27  | Electric Motors   | 8       |  |                             |
| Nov. 1   | Relay based controls                                    | 9       |  | 1,4                         |
| Nov. 3   | Plc/Sensors   | 10      |  |                             |
| Nov. 8   | Lighting  | 11      |  | 1,2                         |
| Nov. 10  | Test  |         |  |                             |
| Nov. 15  | Electric heat   | 12      | 12,13                                    | 1,2,3,4                     |
| Nov. 17  | Standby power   | 13      | 2  | 1                           |
| Nov. 22  | Standby power   |         |  |                             |
| Nov. 24  | Holiday Thanksgiving                                    |         |  |                             |
| Nov. 29  | Lightning and Lightning protection                      | 14      | 2  | 1                           |
| Dec. 1   | Solar and Wind  | 15      |  | 1,6,11<br>(10 hr light/day) |
| Dec. 6   | Solid State Electronics                                 | 16      |  |                             |
| Dec. 8   | Power quality and Stray voltage problems in Agriculture | 17 – 18 |  |                             |
|          |   |         |  |                             |
| Dec. 15  | FINAL EXAM 10:30 – 12:00 AM                             |         |  |                             |

**Tentative Lab Schedule: Subject to change**

| Date          | Laboratory Topic  |
|---------------|---|
| <b>24-Aug</b> | Introduction –symbols & wiring diagrams/schematics                              |
| 31-Aug        | Introduction to lab group/VOM/Amp probe/Circuit tester usage and test equipment |
| <b>7-Sept</b> | <b>Wiring /electrical problems in the lab</b>                                   |
| 14-Sept       | <b>Big Iron</b>   |
| 21-Sept       | Three-Phase   |
| 28-Sept       | Wiring I  |
| 5-Oct         | Demonstration panel   |
| 12-Oct        | Service entrance  |
| 19-Oct        | Magnetic starters/controls/switches/Sensors                                     |
| 26-Oct        | Wiring II   |
| 2-Nov         | Wiring and conductor sizing/Overload protection-Fuses/Circuit breakers/GFCI     |

|         |                                     |
|---------|-------------------------------------|
| 9-Nov   | Bobcat –code reader                 |
| 16-Nov  | <b>Sensors/PLC's</b>                |
| 23-Nov  | <b>Sensors/PLC's</b>                |
| 30-Nov. | PLC Electromagnets and Transformers |
| 7-Dec   | Dead week NO LAB                    |

These are tentative dates for tests and material to be covered, the actual dates and material may vary. **That is why attendance is important.** Any change in schedule will be notified ahead of time.

### Grading:

You will have the following categories of work in the course. Your lowest quiz score will be dropped. Your final grade in the course will be determined by a grade percentage ranging from 0 to 100%. The weighted grade percentage will be computed as follows: 1) divide the total points earned in each work category by the total points possible for that work category, 2) multiply the numbers from step (1) by the weight percentages for each respective work category, and 3) add the results. The weighted grade percentage will be converted to a letter grade using the following straight grading scale. Quiz, lab, and test raw scores will be posted on Blackboard for informational purposes only. *You are encouraged to develop your own spreadsheet to estimate your course grade based on your quiz, lab, and test scores.*

| Item               | Weighted % of total grade |
|--------------------|---------------------------|
| Homework           | 20%                       |
| Quizzes            | 0-5%                      |
| Laboratory reports | 10%                       |
| Tests/Final exam   | 65-70%                    |
| <b>Total</b>       | <b>100%</b>               |

**The cut off for letter grades are: => 90% = A; =>80% = B; =>70% = C; =>60% = D**

### Homework assignment and class project policies:

You are expected to complete all homework assignments and **hand them in for grading on time.** Assignments are **to be done step by step, typed or LEGIBLY handwritten in ink.** A handwritten assignment must be legible to receive full credit. Illegible and/or hard-to-follow solutions will not receive full credit. **Marks will be deducted if steps are not shown in the assignment.** Homework will be collected at the beginning of class on the due date. **No late submissions of homework are accepted.**

### Exams and quizzes policies:

Students are expected to take the **tests at the appointed time and date** unless other arrangements are made with the instructor. The tests will be combinations of types of questions, which may include short answer, problems, multiple choice, and fill in the blank questions, depending on what works best for the material covered. **Quizzes may be given throughout the semester and may be either announced or unannounced.** There are **no make-ups for quizzes or tests, except in medical, family emergencies, or interview cases.** Missed tests, exams, and quizzes will receive zero points unless missed for an acceptable reason and with advance notification where possible. **The final exam will be comprehensive. Marks will be deducted if steps are not shown in word problem(s) in the test(s).**

Class attendance is expected in accordance with NDSU University Senate Policy 333: Class Attendance Policy and Procedure (<https://www.ndsu.edu/fileadmin/policy/333.pdf>). All class materials will be posted

on the BB. If you miss class, the instructor will provide handouts upon your return if asked; you are responsible for obtaining notes from a classmate.

Laboratory reports will be due one week after the laboratory exercise is completed. **Reports are to be typed or LEGIBLY handwritten in ink.** Mark will be deducted for illegible and/or hard-to-follow handwritten lab report.

#### **Resources needed by the Students:**

- Access to Blackboard for materials.
- The textbooks
- A calculator (preferably scientific)

#### **Important Notification**

##### **General:**

Information presented in the class will be a combination of material from the course book as well as other resources. It is imperative that students practice good attendance in order to properly learn the materials.

**Academic Honesty:** *All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (<http://www.ag.ndsu.edu/academics/honor-system-1>). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work best when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.*

*The academic community is operated on the basis of honesty, integrity, and fair play. [NDSU Policy 335: Code of Academic Responsibility and Conduct](#) applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the [Office of Registration and Records](#). Informational resources about academic honesty for students and instructional staff members can be found at [www.ndsu.edu/academichonesty](http://www.ndsu.edu/academichonesty).*

**Students with special requirements:** *Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in the Lower Level of the NDSU Library (231-8463). <http://www.ndsu.edu/disabilityservices/>.*

**Veterans and military personnel:** *Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.*

## Attendance

According to NDSU Policy 333, attendance in classes is expected. Students are responsible for getting any information or announcements made if the class absence is necessary.

## Use of Cell Phones, iPods, MP3 Players, and Other Electronic Devices:

All participants in this class are subject to NDSU University Senate Policy 158: Acceptable use of Electronic Communications Devices (<http://www.ndsu.edu/fileadmin/policy/158.pdf>).

As a courtesy to other students and the instructor, all cell phones, iPods, MP3 players, and other electronic devices except handheld calculators should be turned off or placed in a vibrate-only mode during class time. Initiating phone calls, text message, or other types of messages during class time - including those to friends, family, classmates, coworkers, or supervisors—is unacceptable unless there is a genuine emergency. Examples of emergencies include weather-related school closing announcements; fire, bomb, or other threats to public safety and well-being; and other incidents in which the NDSU system is or could be activated to provide broadcast messages to the NDSU community.

Use of cell phones or other portable electronic devices for communication, transmission, retrieval, or storage of information during the administration of a test or quiz may be considered an incident of **academic dishonesty**. One exception to this policy is the use of handheld calculators for computational purposes. Use of cell phones or similar devices as a calculator during tests and quizzes will not be allowed because it is difficult to distinguish such activity from sending and receiving text messages, which could obviously be interpreted as a form of academic dishonesty.

## Dead Week Policy:

The NDSU Dead Week policy is available at <http://www.ndsu.edu/registrar/dates/deadweek/>.

## Important Dates: (<https://www.ndsu.edu/registrar/dates/2020/>)

|     |    |     |   |
|-----|----|-----|---|
| Aug | 23 | Mon | Classes begin at 4:00 p.m.  |
| Sep | 1  | Wed | Last day to <a href="#">Add</a> classes via <a href="#">Campus Connection*</a> Permit needed after this date. |
| Sep | 1  | Wed | Last day for no-record <a href="#">Drop</a> of classes @ 100% refund* ( <i>full semester classes only</i> )   |
| Sep | 1  | Wed | Last day to <a href="#">Withdraw to Zero Credits</a> @ 100% refund* ( <i>full semester classes only</i> )     |
| Sep | 6  | Mon | <b>HOLIDAY</b> — Labor Day ( <i>no classes, offices closed</i> )  |
| Sep | 7  | Tue | Financial aid applied to NDSU account balances  |
| Sep | 13 | Mon | Last day to submit requests to Audit, <a href="#">Pass/Fail</a>   |
| Sep | 17 | Fri | Undergraduate/Professional Fall <a href="#">Degree Applications</a> due                                       |

|     |       |         |  |
|-----|-------|---------|--|
| Sep | 21    | Tue     | Last Day to Add Full Semester Classes. Permit & <a href="#">Appeal</a> needed after this date.   |
| Oct | 1     | Fri     | Last day to <a href="#">Withdraw to Zero Credits</a> @ 75% refund*   |
| Oct | 15    | Fri     | Late fees applied to unpaid account balances (11:59 p.m.)  |
| Oct | 15    | Fri     | Grades of 'Incomplete' convert to 'F'  |
| Oct | 18    | Mon     | 2nd half (8-week session) of Fall semester begins  |
| Oct | 31    | Sun     | Last day to <a href="#">Withdraw to Zero Credits</a> @ 50% refund* ( <i>full semester classes only</i> ).<br><b><i>No refunds issued for withdraw to zero credits after this date.</i></b> |
| Nov | 2-22  | Mon     | Spring registration begins online based on total credits completed   |
| Nov | 11    | Thur    | <b>HOLIDAY</b> — Veterans Day ( <i>no classes, offices closed</i> )  |
| Nov | 12    | Fri     | Last day to <a href="#">Drop</a> classes with 'W' record*  |
| Nov | 12    | Fri     | Last day to <a href="#">Withdraw to Zero Credits</a> for Fall  |
| Nov | 15    | Sun     | Late fees applied to unpaid account balances (11:59 p.m.)  |
| Nov | 19    | Mon     | Fall Commencement Participation deadline   |
| Nov | 22    | Mon     | Open registration for spring   |
| Nov | 24-26 | Wed-Fri | <b>HOLIDAY</b> — Thanksgiving ( <i>no classes; offices closed Thursday, offices open Wednesday &amp; Friday</i> )  |
| Dec | 6-10  | Mon-Fri | <a href="#">Dead Week</a>  |
| Dec | 13-17 | Mon-Fri | <a href="#">Final Examinations</a>   |
| Dec | 17    | Fri     | <a href="#">Commencement</a> ceremony (2:00 p.m. in Sanford Health Athletic Complex)   |
| Dec | 21    | Tue     | Fall grade access begins online (late evening)   |

**Health and Safety Expectations** Provide links to [https://www.ndsu.edu/admission/fall\\_2020\\_prelim\\_plan](https://www.ndsu.edu/admission/fall_2020_prelim_plan) web resource for information on COVID-19 and NDSU's response. Refer to NDSU guidance on face coverings, physical distancing, and sanitation. NDSU requires students to wear face coverings in classrooms. Wearing face coverings helps reduce the risk to others in case you are infected but do not have symptoms. You must properly wear a face covering (covering both the mouth and nose) for the entirety of the class. If you fail to properly wear a face covering, you will not be admitted to the classroom. However, you may choose to participate in the class remotely. The following will be used as needed: referral to Dean of Students Office or administrative removal from class.

Students who cannot wear a face covering due to a medical condition or disability may seek accommodation through Disability Services (701-231-8463; <https://www.ndsu.edu/disabilityservices/>). Disinfecting supplies are provided for you to disinfect your learning space. You may also use your own disinfecting supplies. Students should observe social distancing guidelines whenever possible. Students should avoid congregating around instructional space entrances before or after class. Students should exit the instructional space

immediately after the end of class to ensure social distancing and allow for the persons attending the next scheduled class to enter the classroom. In accordance with NDSU Policy 601, failure to comply with instructions, including this syllabus, may be handled according to the Code of Student Conduct resolution process and may result in disciplinary sanctions.

Do not allow food and drink in the class unless a student has a documented accommodation through Disability Services. Students will have to remove their masks to eat or drink. Attendance Expectations Refer to NDSU Policy 333 Class Attendance Policy. Consider moving from grading attendance to grading participation and allow multiple ways of participation. Students are expected to attend every class and remain in class for the duration of the session when it is safe to do so in accordance with NDSU guidance regarding COVID19. In this course students should participate in the course mostly face-to-face. When needed, students are also able to participate virtually in synchronous or asynchronous discussions and activities and submit assignments virtually. While the late participation policy for this course is outlined below, please note that I will be flexible regarding deadlines for students who are experiencing illness or other challenges related to COVID-19. Please contact me as early as possible if you think you may not be able to complete an assignment or participate in the course due to illness. This semester due to COVID-19, I do not have an attendance policy as I normally would. Do not come to class if you are sick. You can view the lectures remotely and ask any questions you have on Blackboard Ultra (or Zoom).

Specify steps to take regarding student illness. If you are unable to attend class at the regularly scheduled time due to illness, contact the instructor for alternate arrangements, including recordings of class sessions and assignments as well as accommodations and extensions as needed. Do not come to class if you are sick. Please protect your health and the health of others by staying home and participate in class remotely. For information on COVID-19, symptoms, testing, and steps to stay healthy see <https://www.ndsu.edu/studenthealthservice/covid-19/>. Do not come to class if you have been exposed to individuals who tested positive for COVID-19 and/or you have been notified to self-quarantine due to exposure. If you are absent from class as a result of a COVID-19 diagnosis or quarantine, the decision for approval of all absences and missed work is determined by the course instructor. As instructor, I will do the following to help you make progress in the course: You will be able to participate in class remotely. You will be able to submit assignments and take exams remotely.

Other remote learning options will be determined on a case-by-case basis.

#### Well-being Resources on Campus and in the Community

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

##### For students on campus and remotely (telehealth):

Counseling Services: 701-231-7671

Disability Services: 701-231-8463

Student Health Service: 701-231-7331

##### In a crisis or emergency situation:

Call University Police: 701-231-8998

Call 911

Go to a Hospital Emergency Room

Go to Prairie St. Johns for a Needs Assessment: 701-476-721 (510 4th St. S.)

Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1

Call Rape and Abuse Crisis Center: 701-293-7273

## Syllabus Statement on Masking

Currently (or at the time of writing this syllabus or as of August 9, 2021), NDSU is strongly recommending that all people wear masks in indoor spaces when social distancing cannot be maintained. Further, faculty may require masks to be worn in their classes at their discretion. Consistent with NDSU's recommendations, **in this class all participants, including those who are fully vaccinated, are strongly encouraged to wear a face covering.** Given the changing conditions associated with the pandemic, this class' faculty member has reserved the right to modify the mask status of the class during the semester. If at any time a University-level face mask requirement is in effect, face masks will be required in this class. In case of any changes, you will be notified and this syllabus will be updated.