

**Western Illinois University – School of Agriculture**  
**AGTM 360: Electrical Power & Equipment in Agriculture (3)**  
**Course Syllabus – Fall 2017 “Subject to Change”**

**Course Meets:** T/TH 8:00 – 9:50 am in KH 307/B2  
**Text:** *Electrical Wiring*, 9<sup>th</sup> Edition, Duncan and Wren, ISBN: 0-89606-385-2  
*Wiring a House*, 5<sup>th</sup> Edition, Cauldwell, ISBN: 978-1-62710-674-0

**Instructor:** Dr. Daniel Atherton      **E-mail:** [DL-Atherton@wiu.edu](mailto:DL-Atherton@wiu.edu)  
**Office:** B 22 Knoblauch Hall      **Office Phone:** 309-298-2395  
**Lab Fee:** \$20.00  
**Office Hours:** M/W 1:00 to 1:50 or T 1:00 to 2:50 or by appointment

Dr. Atherton’s Fall 2017 Course Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
Period 1 (8:00-8:50)		AGTM 360 KH 307-Lecture		AGTM 360 KH 307-Lecture	
Period 2 (9:00-9:50)		AGTM 360 KH 307-Lecture		AGTM 360 KH 307-Lecture	
Period 3 (10:00-10:50)				AGTM 471 KH 307-Lab	
Period 4 (11:00-11:50)				AGTM 471 KH 307-Lab	
Period 5 (12:00-12:50)	AGTM 471 KH 307-Lecture		AGTM 471 KH 307-Lecture		
Period 6 (1:00-1:50)	Office Hour	Office Hour	Office Hour		
Period 7 (2:00-2:50)	AGTM 368 KH 307-Lecture	Office Hour	AGTM 368 KH 307-Lecture		
Period 8 (3:00-3:50)	AGTM 207 KH 307-Lecture	AGTM 368 KH 307/B2-Lab	AGTM 207 KH 307-Lecture	AGTM 368 KH 307/B2-Lab	
Period 9 (4:00-4:50)	AGTM 207 KH 307-Lecture	AGTM 368 KH 307/B2-Lab	AGTM 207 KH 307-Lecture	AGTM 368 KH 307/B2-Lab	

**Course Description:** Principles of electricity and its application to wiring buildings, electric motors, automatic controls, and solid-state equipment used in agriculture.

**Course Objectives:**

- Ability to find minimum requirements for safe electrical wiring in the National Electrical Code (NEC)
- Develop capability to correctly plan and assemble electrical circuits according to NEC guidelines
- Develop methodology for troubleshooting existing circuits and correcting electrical faults
- Explain why NEC requirements are minimum requirements for electrical circuits and provide examples
- Capability of planning and assembling “above code” electrical circuits
- Explain operation of electric motors and correct selection of motors for different applications
- Ability to plan and assemble automatic control circuits

**Attendance:** If at any time you miss the lecture or lab, please use the OARS system to report your absence ([www.wiu.edu/oars](http://www.wiu.edu/oars)). I will need the email generated from this system prior to class and not after. If I receive the email after class has ended then the late grade policies come into effect. It is the student’s responsibility to coordinate with the instructor to make up missed work. Quizzes may be given at any time and no makeup quizzes will be given unless the instructor approves the absence prior to missing class.

**Quality of Work Policy:** All assignments should be word processed with title of assignment, name, date, and a summary of the assignment included at the beginning of the assignment. Run spell-checker. If completing multiple-step problems, show all work. Your work should be neat and orderly.

**Academic Dishonesty:** <http://www.wiu.edu/policies/acintegrity.php>

Any violation of the Academic Dishonesty Policy in Student Handbook will result in an automatic failure in the course. Plagiarism and cheating are areas of concern for this course. This course is designed to enhance your writing and presentation skills within your academic area, not the ability to copy other's thoughts and ideas.

**Assessment and Grading:** Your final grade is based on your overall weighted percent of the following:

<u>Component</u>	<u>Percentage</u>
Exam 1	15%
Exam 2	15%
Final Exam	20%
Quizzes	10%
Paper / Project	20%
Class & Lab Participation	20% (Participation includes attendance, discussion, and lab clean up)

#### Grading Scale

A	93 – 100%	A-	90 – 92%	B+	87 – 89%	B	83 – 86%
B-	80 – 82%	C+	77 – 79%	C	73 – 76%	C-	70 – 72%
D+	67 – 69%	D	63 – 66%	D-	60 – 62%	F	< 60%

**Students Rights and Responsibilities:** <http://www.wiu.edu/provost/students.php>

**Disruptive Student Behavior:** <http://www.wiu.edu/vpas/policies/disrupst.php>

**Final Grades:** Unless a computational error was made, grades will not be changed after the end of the semester. Please do not come to the instructor with “extenuating circumstances” for why your grade should be changed – the semester grade represents the level of work you completed over the semester.

**Late Assignments:** No late assignments will be accepted unless the instructor approves of turning in an assignment late prior to the assignment's due date. Assignments will be due at the beginning of class on their due date. Hand written assignments will not be accepted unless instructed otherwise. Assignments will be written in 12 point font with 1” margins. Points will be deducted for incorrect spelling and grammar.

**Professional Learning Environment:** Please be respectful of your fellow students and the instructor and do your part to maintain the professional learning environment of this course. **Please silence your cell phones. Avoid texting during class.** Individual disruptions, such as **entering the classroom late, allowing your cell phone to ring audibly, engaging in unrelated activities (e.g., texting or surfing the web)** during class time, or **packing your belongings before class ends**, distract other students and detract from the quality of the learning environment for the whole class. Infractions will be noted and your class participation grade will suffer. The instructor reserves the right to ask for cell phones to be returned to students after the class period or to remove from group work a student who is demonstrating inadequate levels of participation.

**Attention Education Majors:** The changes within the state certification require all education majors to receive a grade of a "C" or better in this course in order to meet these new requirements. With the university +/- grading system, receiving a "C-" or below will require you to retake this course or find a substitute course to meet School of Agriculture graduation requirements.

**ADA Compliance:** "In accordance with University policy and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. For the instructor to provide the proper accommodation(s) you must obtain documentation of the need for an accommodation through Disability Resource Center (DRC) and provide it to the instructor. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire about such particular needs of students. Students who may require special assistance in emergency evacuations (i.e. fire, tornado, etc.) should contact the instructor as to the most appropriate procedures to follow in such an emergency. Contact Disability Resource Center (DRC) at 298-2512 for additional services."

**University values, Title IX, and other federal and state laws prohibit sex discrimination, including sexual assault/misconduct, dating/domestic violence, and stalking. If you, or someone you know, has been the victim of any of these offenses, we encourage you to report this to the Title IX Coordinator at 309-298-1977 or anonymously online at: [http://www.wiu.edu/equal\\_opportunity\\_and\\_access/request\\_form/index](http://www.wiu.edu/equal_opportunity_and_access/request_form/index). If you disclose an incident to a faculty member, the faculty member must notify the Title IX Coordinator. The complete Title IX policy is available at: <http://www.wiu.edu/vpas/policies/titleIX>.**

**Tentative Schedule \*\*\* Scheduling and weekly topics are subject to change at instructor's discretion \*\*\***

**Schedule:**

Week 1: Introduction to electricity terms, safety, ohm's law, resistance, capacitance, inductance, wire gauge and type, tools, framing basics, series and parallel circuits – voltage division, transformers, open/short circuits, wiring plans and symbols (RC – Ch. 1 & 2; DW – Ch. 1). Midwest Ag. Industries Exposition.

Week 2: Service Entrance Panels (SEP) and Subpanels, buried vs. aerial service, SEP load calculations, meter bases, breaker load balancing, panel bonding – main vs. sub panels. (RC – Ch. 3 & 4; DW – Ch. 11 & 16) Lab – Make electrical measurements with meters and complete series and parallel circuit examples

Week 3: (**Labor Day – no class**) Electrical system grounding, ground wire vs. neutral wire, grounding methods – code vs. above code, ground faults. (RC – Ch. 5; DW – Ch. 12) Lab –Sizing SEP for installation.

Week 4: Electrical circuit planning (room by room and circuit by circuit) – types of circuits, outlet count, routing cables and bundling cables, securing cables, and reviewing differences between new work vs. old work. (RC – Ch. 6; DW – Ch. 2 & 3) Lab – Diagram complete electrical layout from SEP thru branch circuits.

Week 5: Exam I. Current limiting devices – fuses vs. breakers, single & double pole breakers, full & half size breakers. (RC – Ch. 7; DW – Ch. 13) Lab – Single & double pole breaker circuits in SEP.

Week 6: Ground-Fault Circuit Interrupters (GFCI) and Arc-Fault Circuit Interrupters (AFCI). How GFCIs and AFCIs work, required locations, and wiring GFCIs and AFCIs. (RC – Ch. 8; DW – Ch. 14) Lab – wiring GFCIs, AFCIs

Week 7: Circuit hardware – boxes (metallic and non-metallic), box size requirements, cables and conductors, receptacles, polarity, wire connectors and splicing, switches (single-pole, double-pole, three-way, four-way, dimmers, fan speed controls, and common problems) (RC – Ch. 9 & 10; DW – Ch. 4 & 5 & 7 & 8 & 9 & 10 & 15) Lab – calculating box fill, wiring receptacles, single-pole, three and four way switched circuits, wire splices.

Week 8: **(10/20 – Fall Break – no class)** Circuit hardware – boxes, box size requirements, cables and conductors, receptacles, polarity, wire connectors and splicing, switches (single, double-pole, three, four-way, dimmers, and common problems) (RC – Ch. 9 & 10; DW – Ch. 4 & 5 & 7 & 8 & 9 & 10 & 15) Lab – calculating box fill, wiring receptacles, single-pole switched circuits, three and four way switched circuits, wire splices.

Week 9: Installing cables and conductors for fixtures and appliances. (RC – Ch. 11 & 12; DW – Ch. 17) Lab – Rough-in wiring of circuits – DLA - OOT – No class Oct. 17<sup>th</sup>.

Week 10: Lightning and surge protection – induced voltage, adding surge protection. (RC – Ch. 13) Standby generators – picking a generator and transfer switch installation (RC – Ch.14) Wet environment wiring. Lab – Finish rough-in and complete finish wiring

Week 11: Electric motors – wire sizes for motor circuits, motor sizing, motor characteristics, and motor starters, SCRs, etc... Lab – electric motors and controls

Week 12: Solid state/electro-mechanical devices – diodes, transistors, logic gates, and relays. Automated control – temperature, pressure, level, and flow control systems. Lab – Automated control

Week 13: Automated control – temperature, pressure, level, and flow. Lab – Automated control. DLA - OOT – No class Nov. 14<sup>th</sup>

**Thanksgiving Break – Nov. 20-24 – no class**

Week 14: Basic programmable logic controller (PLC) programming. Lab – practice simple PLC programming

Week 15: Programmable logic controller (PLC) programming (continued). Lab – PLC programming.

Final Exam: Tuesday, December 12<sup>th</sup> from 8:00 to 9:50 am in room KH 307