COURSE SYLLABUS

AVT 310 Aircraft Electrical Systems

Fall 2015

Instructor: Keven Mitchell

Office: Transportation Education Center (TEC), Room 226F

Tel.: Office 618-453-9203 Cell 618-303-0539

Office hours – Mondays and Wednesdays 9:00 to 12:00, or by appointment.

Course Texts:
Eismin, Thomas Aircraft Electricity and Electronics, 6th Ed. 2014 Glencoe/McGraw Hill

FAA, AC 43.13-2 B: Acceptable Methods, Techniques And Practices

Textbooks not available at the University Bookstore can be ordered on-line such as Half.com, Amazon.com, eCampus.com, bigwords.com, alibris.com, or valorebooks.com, and by special order through Barnes & Noble and most academic bookstores 710 Bookstore and Saluki Bookstore.

Course Equipment needed:
Digital Volt/Ohm meter
Hand tools
Safety Glasses
Earbuds or Headphones

Course Location: Lecture room 182 TEC
Lab room 144 AVT

Course Times: Lecture – Monday, Wednesday and Fridays @ 1:00pm - 1:50pm

* Lab Group I – Tuesday @ 3:00pm and Thursday @ 3:00pm – 4:50pm
Lab Group II – Tuesday @ 1:00pm and Thursday @ 1:00pm – 2:50pm

* Andy Craig will teach section I’s Lab group.
Course Description:
This course will provide the student with a working knowledge of the operation, repair, inspection and service of General Aviation to Transport aircraft electrical systems and components covered in Part 147 Powerplant, Airframe and General sections. Use of schematic diagrams for fault analysis will be emphasized. Students will be introduced to various types of test equipment applicable to aircraft electrical & electronic troubleshooting.

Course Objectives:
Upon completion of this course the successful student will be able to:

1. Demonstrate an understanding of aircraft DC generators and associated DC control circuits.

2. Demonstrate an understanding of aircraft alternators and related controls, including the purpose and operation of Constant Speed Drives (CSD), Integrated Drive Generators (IDG) and Variable Speed, Constant Frequency (VSCF) drive systems.

3. Demonstrate an understanding of the operation and trouble diagnosis of integrated electrical systems and controls used by all types of aircraft, including electrical load analysis and electrical load management.

4. Demonstrate an understanding of types of electric motors used in aircraft.

5. Perform tests and repairs on generators, alternators and other aircraft electrical equipment.

6. Briefly explain procedures to inspect and test selected aircraft Avionics systems.

Lecture Topics:
Topics to be included in this course include, but are not necessarily limited to, the following:

1. Aircraft wiring
   a. Ohms Law review
   b. Grounding
   c. Soldering
   d. Crimping
   e. Loading
   f. FARs covering aircraft wiring requirements

2. Aircraft Generators
   a. Review fundamentals of basic electricity
   b. Aircraft DC Generators Basic Theory
   c. Characteristics and types
   d. Essential parts
   e. Inspection, maintenance, troubleshooting and repair
3. DC Generator Controls
   a. Theory of Voltage Regulation Regulator
   b. Control Circuit Operation

4. Aircraft Alternators
   a. Types and purpose
   b. Theory of operation
   c. Essential parts
   d. Inspection, maintenance, troubleshooting and repair

5. Alternator regulation
   a. Voltage reference and sensing
   b. Regulator components

6. Electrical load analysis

7. Constant speed drives (CSD) and integrated drive generators (IDG) and variable speed constant frequency (VSCF)
   a. Theory, types and purpose
   b. Operation
   c. Inspection

8. Aircraft Motors
   a. DC Motors AC Motors theory
   b. Motor Construction and characteristics
   c. Inspection and maintenance of motors

9. Inverters

10. Direct current electrical systems
    a. Inspection, troubleshooting
    b. Servicing and repair

11. Alternating current electrical systems
    a. Inspection, troubleshooting
    b. Servicing and repair

12. Fire Warning systems
    a. Types of systems
    b. Inspection and Testing

13. Fire Extinguishing systems
    a. Conventional systems
    b. HRD system

14. Avionics systems
    a. Communications
    b. Navigation
    c. Auto pilot systems
Laboratory Projects:

1. Crimp and splice wiring to manufacturer’s specifications and solder pins and sockets of aircraft connectors. Grounding aircraft wiring to aircraft surface IAW FAR 43-13-2B
2. AC Generators and Constant Speed Drives.
3. Aircraft DC Generators
4. DC Generator Controls systems
5. DC Aircraft Alternators
6. DC Aircraft Alternators Regulators
7. Cessna 172R/S Electrical systems analysis
8. Cessna DC Alternator Charging system testing
9. Light Twin Electrical systems
10. Transport Category Electrical systems
11. Aircraft Indication and Warning systems
12. Aircraft Antenna Identification and Inspection
13. DC Generators system analysis & Troubleshooting
14. Communications and Navigation
15. Fire Warning/overheat detection & Extinguishing systems

Laboratory worksheets for each project should be completed as work progresses on the project. Where "Instructor's OK" is noted on the worksheet the instructor should be consulted for approval before proceeding (wave able to keep student on course while making up past labs). Once all of the steps for a given task are completed the worksheet should be submitted to the instructor for evaluation. Incomplete or unsatisfactory work must be corrected before proceeding to the next project (wave able to keep student on course while making up past labs).

Evaluation:

Lecture:

The lecture grade will be determined by the students' performance on tests, quizzes and a final exam. Unit tests will be announced at least one week in advance; quizzes may be unannounced (and will not be made-up); the final exam will be scheduled during finals week. The grading scale is the standard Aviation Technologies scale as shown in the table below.

Laboratory:

The laboratory grade will represent the portion of the course grade. Lab projects specified by the instructor must be completed prior to taking each lab test. Reminder: Failure to complete all of the labs will result in an FAA grade of F, and will be required for all projects before FAA certificates can be issued. Lab points for grading purposes will be earned as a result of completing all labs, quality of work, and taking two lab tests. The first lab test will be taken around midterm, the second will be during finals week.

FAA Grades:

Please be advised that our FAA accreditation requires posting a separate grade for lecture, final exam and lab on the FAA student record card. Failure in any one of these areas, even though the average grade may be passing, will necessitate completing additional course work or repeating the course.

NOTE: Failure to complete all of the labs will result in an FAA laboratory grade of F unless requirements for incomplete are met in accordance with school regulations.
**SIU Grade:**

The grade submitted to the Office of Admissions and Records is the average of all course evaluations, lecture and lab, and does not appear on the FAA grade sheet.

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<thead>
<tr>
<th>%</th>
<th>Grade</th>
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<tbody>
<tr>
<td>100-90</td>
<td>A</td>
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<tr>
<td>89-80</td>
<td>B</td>
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<tr>
<td>79-70</td>
<td>C</td>
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<tr>
<td>69-60</td>
<td>D</td>
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<tr>
<td>59 ----</td>
<td>F</td>
</tr>
</tbody>
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Point Distribution: *(estimated and approximate)*

Scores will be posted following each evaluation item. Cumulative point totals and current averages will be shown with the posted scores.

Tools & Supplies: Each class member will be expected to have appropriate tools available during each lab period. Lockers are available in the Aviation Technologies building for tool storage. Students must assume primary responsibility for tool security.

The following guidelines apply during all lecture and laboratory tests, quizzes and the final exam. They are also the basis for all work associated with laboratory projects.

**TEST DOCUMENT**

The test document and any additional handouts or scratch paper, regardless of source, is the property of the course instructor. Do not remove the staple from the test.

**ANSWERS**

You must place all of your answers on the test. All answers which require anything more than circling a provided answer *must be printed legibly*. Cursive (handwriting) will not be accepted and the answer will be marked incorrect.

**SCANTRON ANSWER SHEETS**

Scantron answer sheets may be used. When a Scantron answer sheet is used you *will not* mark your answers on the test document. Be sure to leave the response on the Scantron sheet blank for any questions that were fill in the blank or required you to provide an illustration on the test document. Ensure you mark your lab section and test number on your Scantron answer sheet for full credit. Be sure to use a number two pencil (which you must supply) and fill in the dot completely.

**CALCULATIONS**

Show all calculations necessary to derive the answer to mathematical questions. Correct answers without necessary calculations will not be accepted. It is your responsibility to bring a calculator to class with you. Calculators cannot be shared or exchanged during a test.
ROUNDING
Maintain as many digits of precision as possible (whatever the calculator will carry) while working through the problem. Your final answer should be rounded, as necessary, to the hundredths decimal place, or to the precision required by the question.

QUESTIONS
Any questions you may have about a test item should be held until shortly before the end of the testing period. The instructor will let you know when questions may be asked, usually near the end of the testing period.

PROPERTY
Do not exchange any materials with any other student during the testing period.

REMAIN SEATED
Do not leave your seat unless you have completed the test. If you have a problem such as a broken pencil or dead batteries in your calculator, raise your hand until you draw the instructors’ attention.

COMPLETION
Turn in the document and the Scantron answer sheet when you finish.

SILENCE
Please maintain silence during the testing period.

CHEATING
No form of academic dishonesty, (see SIU Student Conduct Code, Division IV), will be tolerated.

Attendance

Attendance is mandatory. There is a direct correlation between attendance and performance in a course. Students who are absent can expect their performance on projects and tests to suffer. As an FAA certified Airframe and Powerplant Mechanic Training Program, we must abide by the FAA’s attendance policy. Instructors are required to take roll each class period. It is the student’s responsibility to contact the instructor in advance of absences whenever possible or immediately thereafter to arrange make-up time where appropriate and to obtain hand-outs or other material from classes missed.

Students are expected to be in class and lab on time. Three late arrivals will be counted against the student as one unexcused absence. Unexcused absences or habitual tardiness will result in a cumulative reduction of the student's final grade point average: First unexcused absence results in a one-point reduction of the final grade (0-100 scale). Second absence results in a two-point reduction. Third absence results in a four-point reduction. Fourth absence results in an eight-point reduction. Fifth absence results in a sixteen-point reduction. After the fifth unexcused absence the cumulative grade reduction would be 31 points, making it impossible to receive a passing grade for the course.

Make up time may be granted at the discretion of the instructor. Final determination as to whether or not an absence is "excused" rests with the instructor. Performance of make-up time does not reinstate points lost due to unexcused absences.

Makeup instruction will only be provided if approved, coordinated and completed within two weeks of an absence. Failure to make up lost time will reduce grades per occurrence.
If you are not present when attendance is taken you will be marked absent. If you arrive late, but less than 10 minutes late, it is your responsibility to approach the instructor upon your arrival or in lecture, at the end of the period to have your "absence" changed to a "late" in the instructor's attendance journal. Failure of the student to approach the instructor upon arrival or at the end of a lecture period will result in the absence as recorded. Two "lates" (less than ten minutes) will count as one unexcused absence, with the accompanying grade reduction. Changes to the attendance journal will not be made, under any circumstances, after the end of the day that you arrived late. Late to class on quizzes or test will result in a zero for quiz and minus a point of every minute late for a test from the time the test is administered to your start of the test.

Safety:

All students must wear Personnel Protection Equipment (PPE) while in labs. Protective glasses will be worn at all while soldering and drilling.

University Standard of Academic Honesty:

All courses offered by the college will be conducted in concert with the ethical standards of the aviation profession and the SILTC policy on academic honesty. This policy may be found in the Undergraduate Catalog. Each student is responsible for being aware of and understanding the policies and procedures in the Undergraduate catalog that pertain to Academic Integrity. These policies include cheating, fabrication, falsification and forgery, multiple submissions, plagiarism, complicity and computer misuse.

Emergency Procedures:

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT’s website at www.bert.siu.edu Department of Safety’s website www.dps.siu.edu (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

ADA Statement:

Students with disabilities who may need accommodations, or who have any emergency medical information the instructor should know of, or who need special arrangements in the event of evacuation, should make an appointment with the instructor as early as possible, no later than the first week of the term. Students also need to contact the SIUC Disabilities Support Services Office in Woody Hall B-150. Call 453-5738
IMPORTANT DATES *
Semester Class Begins ..........................................................08/24/2015
Last day to add a class (without instructor permission):..............08/30/2015
Last day to withdraw completely and receive a 100% refund: ........09/06/2015
Last day to drop a course using SalukiNet: .........................11/01/2015
Last day to file diploma application (for name to appear in Commencement program): ..............................................12/14–12/18/2015
Final examinations: .................................................................01/19/2016

Note: For outreach, internet, and short course drop/add dates, visit Registrar’s Academic webpage http://registrar.siu.edu/

FALL SEMESTER HOLIDAYS
Labor Day Holiday 09/07/2015
Fall Break 10/10–10/13/2015
Veterans Day Holiday 11/11/2015

WITHDRAWAL POLICY - Undergraduate only
Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

INCOMPLETE POLICY - Undergraduate only
An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student’s grade point average. For more information please visit: http://registrar.siu.edu/grades/incomplete.html

REPEAT POLICY
An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A,B,C,D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

GRADUATE POLICIES
Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit http://gradschool.siu.edu/about-us/grad-catalog/index.html

DISABILITY POLICY
Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of studentsupplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu/

PLAGIARISM CODE
http://pvcaa.siu.edu/_common/documents/Plagiarism/Guide%20to%20Preventing
%20Plagiarism.pdf

MORRIS LIBRARY HOURS
http://www.lib.siu.edu/about

SAFETY AWARENESS FACTS AND EDUCATION
Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: http://safe.siu.edu

SALUKI CARES
The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families. SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For information on Saluki Cares: (618) 453-5714, or siucares@siu.edu, http://salukicares.siu.edu/index.html

EMERGENCY PROCEDURES
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INCLUSIVE EXCELLENCE
SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. For more information please visit: http://www.inclusiveexcellence.siu.edu/

LEARNING AND SUPPORT SERVICES
Help is within reach. Learning support services offers free tutoring services on campus and math labs. To find more information please visit the Center for Learning and Support Services website:
Tutoring : http://tutorial.siu.edu/
Math Labs http://tutorial.siu.edu/math_tutoring/index.html

WRITING CENTER
The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu/AVAILABILITY ACTION & EQUAL OPPORTUNITY
Our office’s main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: http://diversity.siu.edu/

Additional Resources Available:
SALUKINET: https://salukinet.siu.edu/cp/home/displaylogin
ADVISEMENT: http://advisement.siu.edu/
SIU ONLINE: http://online.siu.edu/