EET
Electrical Design 225
Course Outline

Electrical Engineering Technology

Winter 2015

Instructor: Ken Manweiler **Phone:** 403-342-3482 **Email:** ken.manweiler@rdc.ab.ca

Office Hours: 8-4:30 M-F **Office:** 2915 – 71A

Class Time: Mon, Wed 4:30-5:50 **Room:** 1203

Lab Time: Mon 11:00-11:50 **Room:** 907B

Credit hours: 3 **Prerequisite:** EET 210

Academic Calendar Entry: Explore the electrical design of industrial plants and motor control centers. Specify size and produce schematic drawings for control of industrial loads. Examine substation wirings equipment and grounding. Apply appropriate power factor correction techniques and device

Learning Outcomes:
Students who successfully complete this course will be able to:

- Use of Canadian Electrical Code to determine minimum requirements for commercial and industrial electrical installation;
- Identify contract documents, layout of specifications, drawings in a typical construction drawing set and forms used for preparing an electrical estimate for both commercial and industrial occupancies;
- Identify symbols and notations used on electrical drawings;
- Identify hazardous locations and hazardous material in the workplace;
- Produce various electrical commercial and industrial drawings (single line, wiring diagrams, BOM and reports) with the help of AUTOCAD design tool;
- Identify the components, proper size of protection devices (fuse and circuit breakers) for both commercial and industrial sites;
- Identify the features of trolley busways, panelboard types and feeder connections to panelboards;
- Demonstrate the machine layout, various types of motors and motor controllers, conductor size used in the industrial building;
- Identify the major components and installation requirements for PLC;
- Demonstrate the concept and corrective measures for power factor;
- Identify the devices use to provide system protection for both commercial and industrial units;
- Perform short circuit calculations for both commercial and industrial units;
- Describe the lighting process, requirements for protection of industrial building:
- Describe harmonic and characteristics of different harmonics;
- Recognize different service types, grounding system for commercial building;
- Determine the correct size of branch circuit protection, voltage drop for single phase circuit for commercial sites
- Determine minimum zoning requirement, emergency standby system for commercial buildings;
- Demonstrate the importance of CEC sections that pertain to interrupting rating,

available short-circuit current, current-limitation, effective grounding, bonding, and temperature limitation of conductors;
- Read, interpret, and draw simple electrical installations both for commercial and industrial units;
- Knowledge of safe work practices, procedures and responsibility for safety in the workplace.

Learning Activities:
Teaching in this course is comprised of lectures, readings, seminars, reports, and assignments. Students can expect to engage in small group work at times during all components of the course.

Course Topics:

Week	Date	Classes (Monday, Wednesday)	Lab
1	January 5, 7	Course outline, review of Canadian electrical codes, commercial and industrial building plans and specifications, hazardous locations and hazardous materials in the workplace, electric service for commercial unit	Introduction to AUTOCAD
2	January 12, 14	Branch circuits and feeder, House circuits, emergency power system	Reading electrical drawing – bakery, insurance office/beauty salon, drug store and hand on practice with AUTOCAD (Part 1)
3	January 19, 21	The cooling system, panelboard selection and installation, branch circuit installation (**Assignment 1**)	Reading electrical drawing – bakery, insurance office/beauty salon, drug store and hand on practice with AUTOCAD (Part 2)
4	January 26, 28	Fire alarm and safety system, luminaires and lamps, switches and receptacles	Wiring diagram of cooling system using AUTOCAD (Part 1)
5	February 2, 4	Alternate system, Overcurrent protection (fuse and circuit breakers), short circuit calculations (**Assignment 1 due on Feb 4, 2015**)	Wiring diagram of cooling system using AUTOCAD (Part 2)
6	February 9, 11	Equipment and conductor short circuit protection, low voltage remote control lighting (**Assignment 2**)	Design of double ended sub-station layout using AUTOCAD (Part 1)
7	February 16, 18	**MID-TERM BREAK**	
8	February 23, 25	Mid-term Exam (Feb. 25) Service equipment (Feb. 27)	Design of double ended sub-station layout using AUTOCAD (Part 2)
9	March 2, 4	Motor installation, motor controllers (**Assignment 2 due on March 4, 2015)**	Design of auto-transformer type reduced voltage starter to control motor using AUTOCAD (Part 1)
10	March 9,11	Busways, panelboards (**Assignment 3**)	Design of auto-transformer type reduced voltage starter

			to control motor using AUTOCAD (Part 2)
11	March 16, 18	Wire tables and determining conductor sizes, programmable logic controller	Design of circuit used to alternate the operation of two well pumps using AUTOCAD (Part 1)
12	March 23, 25	Electric welder, Power factor (**Assignment 3 due on March 25, 2015)**	Design of circuit used to alternate the operation of two well pumps using AUTOCAD (Part 2)
13	March 30, April 1	Lighting and lighting protection (**Assignment 4**)	
14	April 6, 8	Harmonics (**Assignment 4 due on April 8, 2015)**	**Project Submission on April 8, 2015**

Required Textbooks and Equipment:

Electrical Wiring commercial, Sixth Canadian Edition; Mullin, Branch, Filice, Maltese, Marchetti; Nelson Publication

Electrical Wiring Industrial, Fourth Canadian Edition; Herman, Branch, Granelli, Trinner; Nelson Publication

Electrical Design of commercial and industrial building, 2011 edition; John Hauck; Joner and Bartlett Learning

Laptop with wireless Internet access

AUTOCAD 2015 (Free Download Student version)

Recommended Readings and Resources:

AUTOCAD Electrical 2015 Fundamentals IEC; Ascent – center for technical knowledge Canadian Electrical codes, Part 1, 22nd Edition, 2012; CSA Publication

Assessment of Student Performance:

The final grade in this course will be computed based on the following elements. At all times the Red Deer College final examinations policy will be adhered to.

1. **Written assignments (4)** Description: involving mathematical abstractions, modeling and analysis, applications and conceptual understanding. May be in the form of quantitative extended responses or qualitative reasoning. Weighting: **10** %
2. **Mid-Term Exams (1**) Description: involving mathematical abstractions, modeling and analysis, applications and conceptual understanding. May be in the form of multiple-choice questions, quantitative extended responses or qualitative reasoning. Weighting: **20** %
3. **Lab Reports (6)** Description: involving following instructions, taking measurements, analysis, applying concepts and communications skills. May be in the form of written explanations, quantitative reasoning or qualitative design. Weighting **20** %
4. **Final Exam (1)** Description: involving mathematical abstractions, modeling and analysis, applications and conceptual understanding. May be in the form of quantitative extended

responses or qualitative reasoning. Weighting **25%**

5. **Final Project (1)** Description: Each student will design a commercial or industrial unit as per CEC standards including single line, wiring diagram, list of material and report. Due date for project submission will be the first week in April.

   (Note: Select your own project dimensions and get approved before January 20, 2015. Weighting **25%**

Grading System:

Final grades will conform to the college's letter grade system. As the actual conversion from mark to grade is both course and instructor dependent, the following conversion table is presented for general reference only:

Percentage	Grade	Description
95-100	A+	
90-94	A	Excellent Performance
85-89	A-	
80-84	B+	
75-79	B	Good Performance
71-74	B-	
67-70	C+	
63-66	C	Satisfactory Performance
59-62	C-	
55-58	D+	Pass
50-54	D	
0-49	F	Fail

Midterm Feedback:

Midterm course feedback will be available (upon appointment) from the instructor following the midpoint mark of the course. Students are strongly encouraged to consult with their instructor regarding cumulative academic performance below 2.0 (grade of C).

The RDC Final Examination Policy will be followed with respect to Final Examinations. Please review this document to ensure you understand the contents and implications of the policy. The Final Examination Policy is available on the RDC Policies website.

Attendance requirements:

The faculty of the Department believes that students are committed to their program and learning experiences. However, it is understood that there are times when students may be absent from those experiences. Any absence can be viewed as a potentially serious disruption of the learning process and necessary achievement of the learning objectives.

Attendance is required in all labs. Any student who, due to extenuating circumstances, will be late or absent for a lab must notify the instructor at least one hour prior to the beginning of the lab. Failure to notify the instructor indicates a serious breach of professional and ethical conduct. Valid documentation for missing any assessment will be required. In most cases, make up activities will not be available.

Late or missed assignments: Assignments submitted one or two days late will be subject to a penalty of 25 % per day. Assignments submitted more than two days late will be considered as missed, and will receive no grade.

Academic Misconduct:

Please become familiar with what constitutes academic misconduct, as well as the consequences. Plagiarism involves submitting work in a course as if it were the student's own work. Plagiarism may involve the act of submitting work in which some or all of the phrasing, ideas, or line of reasoning are alleged to be the submitter's own but in fact were created by someone else. The complete policies are available on the RDC Policies website: Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy.

Changes to the Course Outline:
Changes to the course outline will be made with the consent of the course instructor and students. Changes will be reviewed by the Department Chairperson for consistency with College policies.

Important Dates:

First day of classes for Winter term	January 5, 2015
Last day to register or add/drop Winter courses	January 13, 2015
Family Day 2015. College closed	February 16, 2015
Mid-term break for Winter term 2015	February 17 – 20, 2015
Classes resume after mid-term break Winter term 2015	February 23, 2015
Final exam schedule posted Winter term 2015	March 13, 2015
Good Friday 2015. College closed.	April 3, 2015
Last day to withdraw from Winter term without penalty	April 10, 2015
Last day of classes Winter term	April 10, 2015
Final exams	April 15 - 21, 2015
Final grades available	April 29, 2015

NOTE: A supplementary document is included with this course outline, which contains a tentative course schedule. This schedule is tentative to allow the instructor some flexibility to deal with unexpected issues, which might arise.

This course may be eligible for Prior Learning Assessment. Students should refer to the RDC Course Calendar for a list of excluded courses.

Students should be aware that Personal Counselling, Career, Learning and Disability Services are provided by RDC. Inquire about locations at Information Desk. It is the student's responsibility to discuss their specific learning needs with the appropriate service provider.

It is the student's responsibility to be familiar with the information contained in the Course Outline and to clarify any areas of concern with the instructor.

Students should refer to the Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy should questions or concerns about the Course Outline not be resolved directly with the instructor.

A plagiarism detection tool is used in this course.

Chairperson:

Date: December 22, 2015

Appendix A - Course Outline Policy Checklist

Critical Elements to be included on all course outlines:

- ☐ The academic term and year of the course offering.
- ☐ Instructor names, office phone numbers, RDC email address, office hours.
- ☐ All class meeting times and room numbers, which may include required seminars, labs, field trips, online sessions, work experience, or alternative learning experiences.
- ☐ Academic calendar entry from the Red Deer College Calendar including credit hours and prerequisites.
- ☐ Learning outcomes.
- ☐ Course topics.
- ☐ The proposed learning activities, which may include lectures, discussions, field trips, activity-based learning, group work, web enhanced instructions.
- ☐ A list of all required textbooks, supplementary readings, required/recommended equipment and materials.
- ☐ Assessment of student performance with as much detail as possible:
  - ☐ the methods of assessment;
  - ☐ the weight of each assessment as it relates to the calculation of the final grade;
  - ☐ an indication, with as much specificity as possible, of the expectations as they relate to the grading criteria for each assessment.
- ☐ Anticipated timelines (indicated by the "week of") for graded assessments.
- ☐ A statement that the Final Examinations Policy will be followed with respect to final exams.
- ☐ A clear statement of penalties and procedures for late or missed graded assessments.
- ☐ A statement of requirements for attendance and participation, if applicable. Include, **"Attendance may take many forms. Lack of attendance may impact the students' ability to successfully complete the course."**
- ☐ A statement informing students that the Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy are in effect, such as **"Please be familiar with what constitutes academic misconduct, as well as the consequences. Plagiarism involves submitting work in a course as if it were the student's own work. Plagiarism may involve the act of submitting work in which some or all of the phrasing, ideas, or line of reasoning are alleged to be the submitter's own but in fact were created by someone else. The complete policies are available on the RDC Policies web site:** Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy.
- ☐ A clear statement of the procedures for making changes to the Course Outline.
- ☐ The date to drop/add the course.

The date to withdraw from the course without academic penalty.

- ☐ A statement that indicates, **"This course may be eligible for Prior Learning Assessment. Students should refer to the RDC College Calendar for a list of excluded courses."**
- ☐ If applicable, a statement informing students **"A plagiarism detection tool is used in this course."**
- ☐ A statement informing students that, **"Classroom Learning Resources may be available to students in alternative formats."**
- ☐ A statement regarding availability of student services such as, **"Students should be aware that Personal Counseling, Career, Learning and Disability Services are provided by RDC. Inquire about locations at Information Desk. It is the student's responsibility to discuss their specific learning needs with the appropriate service provider."**
- ☐ A statement informing students **"It is the student's responsibility to be familiar with the information contained in the Course Outline and to clarify any areas of concern with the instructor."**
- ☐ A statement indicating that **"Students should refer to the Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy should they have questions or concerns about the Course Outline that cannot be resolved with the instructor."**

Note:

- ☐ Instructors are to send an electronic copy to the Chairperson or designate in adequate time for it to be reviewed and approved before the first day of classes.
- ☐ Instructors are to present and explain the signed Course Outline of the first day of class and provide an opportunity for discussion of it.
- ☐ On the first day of class the instructor will distribute printed copies of the Course Outline and/or distribute it electronically to all registered students.
- ☐ If SafeAssign is to be used in this course, instructors must ensure that they have checked (√) the box providing students with a copy of the report that is generated.

Checklist for Chairpersons or their designate:

- ☐ Review the electronic copy of the Course Outline for completeness and consistency with associated College policies and Departmental policies, and sign it electronically if compliance has been achieved.
- ☐ Ensure that the Final Exam Policy is being followed.
- ☐ Forward the signed electronic copy of the Course Outline in PDF format to:
  - ☐ the instructor
  - ☐ the holder of the department's files
  - ☐ to the Records Coordinator in the Registrar's Office by the end of the first week of classes.