MELTEC 320
ELECTRICAL SAFETY
COURSE SYLLABUS

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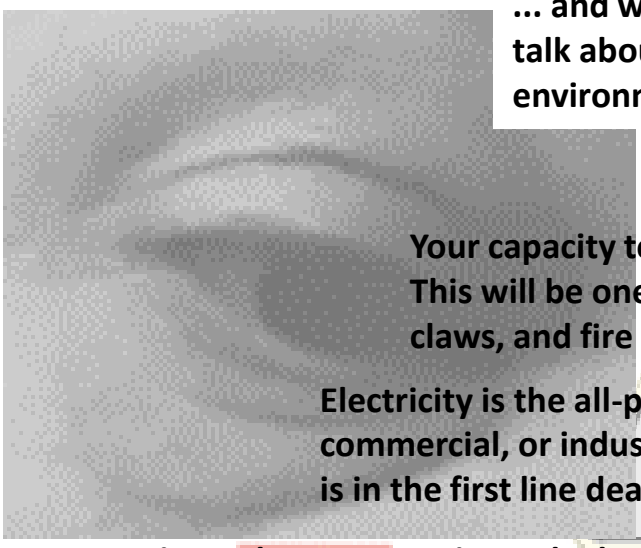
Are you paying attention?
Are you listening?
Are you watching?
Are you alert?

That's what the spirit of SAFETY is about!!!
... and we are not going to talk about just any work environment... but the work environment where ELECTRICITY dwells in the belly of the beast!!!



Your capacity to pay attention will be challenged every class... This will be one hour – a rollercoaster hour – about the fangs, claws, and fire of the invisible dragon that moves our civilization.

Electricity is the all-present energy form in any modern dwelling, commercial, or industrial environment, and the Modern Technician is in the first line dealing with this awesome power.

We are going to learn - or review - the basic tenets of the physics of electricity, and apply it to the safety of the worker working on, or near, energized equipment.

We will learn the rational framework that establishes the needed protocols and procedures to work safely even in dangerous situations. This rational framework is expressed in standards and regulations, in the strange landscape where law and engineering intersect.

Your rights:

- **You have the right to learn and succeed.**
  - **To exercise this right, you are entitled to ask questions and receive answers - good answering answers - from your instructor, within the timeframe of the class, or, if the case requires it, after class or during the instructor's office hours.**
  - **To exercise the right to learn and succeed, you are entitled to good reading material that you have to read, and homework, that you have to do, all of which will help to mature and fix concepts. Moreover, you have the right to receive your homework graded in a timely fashion and receive explanations about why corrections were made so you can learn from your mistakes.**

- **You have the right to review your exams - all of them - with your instructor; understanding your mistakes and learning from them.**
- **You also have the right to fail by not exercising your right to succeed, and although you will be warned, you will be not prevented from failing the class.**

Want to be successful?

- **Class will start on the dot: Be 5 or 10 minutes early.**
- **Classes build up one upon the other: Review what was going on.**
- **Unless you are in a real pinch, DO NOT skip a class. Let your instructor know that you are not attending to a class so some guidance can be given to you.**
- **Safety is important... but boring! Have a partner or make a study group.**
- **Homework will expand the view offered in class. Do it!!! It is all about YOU!**

Your duties:

- **You must adapt to work in a group of individuals that have the same rights than you, so, you have to understand that your rights cannot cast a shadow over the rights of others.**
- **You must follow the indications given for your instructor, completing readings and assignments within the established timeframes. Timeframes that will be established by your instructor, and that will have little or nothing to do with your personal needs.**
- **You must be trustful, never asking for, or giving undue help during exams.**

VERY IMPORTANT: Attendance prior Census Day is mandatory. Failing to show up or to let the instructor know that you have to miss class during these critical weeks will automatically drop you from the roster.

Course scope: This course is oriented to the understanding of electrical hazards to prevent them. Students are introduced to methods and techniques on how to recognize, evaluate, and control electrical hazards. Some guidance regarding how to proceed in case of an emergency is also covered.
ELECTRICAL SAFETY – ELTEC 320 addresses:
Standards and regulatory compliance (OSHA 1910 Subpart S, OSHA 1926 Subpart K, NFPA 70E),
Safe work practices,
Personal protective equipment,
Technical knowledge of recognized and generally accepted good engineering practices.

Student Learning Outcomes

At the end of this course the student will be able to

1. Recognize and evaluate electrical hazards
2. Control electrical hazards by following safety procedures and using appropriate protective equipment.

Bibliography

Required

1. **Managing Electrical Hazards**, NCCER, Third Edition (Based on 2015 NFPA 70E)
2. **Handbook for Electrical Safety – Edition 2**, Cooper Bussmann
   Not sold in Pirates' Bookstore, available at
   www.mikeholt.com/img/mojonews/SafetyHandbook2004.pdf (free)
3. **DOL 29 CFR 1910 SUBPART S and 29 CFR 1926 SUBPART K**
   Instructor will provide guidance

Highly Recommended

- **NFPA 70E – Standard for Electrical Safety in the Workplace – 2015 Edition**
- **Handbook for Electrical Safety in the Workplace – 2015 Edition**

Other Important On-line Resources

- DOE Electrical Safety Handbook – DOE-HDBK-1092-2013 (free)
- Cal/OSHA Electrical Safety Guide (free)

Class Requirements: A broad scope of issues is going to be covered in these classes. Lectures, presentations, videos, reading assignments, exercises, quizzes, and homework will be the parts of a whole. One hour a week in the classroom will demand several hours of reading afterwards. Being on time is of the essence of getting the most of this course. Reading the material ahead of time is a good idea but it is not required. Reading the class's material after the class is a must-do.

Attendance prior and after Census Day: Regular attendance is essential to ensure success in this course. Students must give notice to the instructor if they are planning to miss a class before the second week (prior to census day) to avoid being dropped from the roster.

After the second week, if a student stops attending the class, for personal or work related reasons, it is the student's responsibility to drop this course. If after the second week, and before the completion of the 75% of the course, a student stops attending but forgets to drop the class, the instructor could, unintentionally, overlook the situation and fail to drop the student from the roster. In such case, the final grade would be likely an "F"

Exams and Grading Criteria:

On-topic Open-notes In-class Quizzes (OOQ): Most classes will have 1, 2, or 3 comprehension tests delivered throughout the class. These quizzes will be focused on the topic just delivered; however, given the technical nature of this course, questions may imply the understanding of previous materials. These quizzes will represent **25 %** of the total grade.

Homework: Homework will be delivered as open book quizzes in Blackboard (Bb). Completing the quizzes is the only tangible proof that the student has been reading the material, which is the only way that the contents of this course can be reasonably thoroughly covered. These assignments are not only important elements to achieve good grades, but also important elements to prepare the exams. It will weigh **25%** of the total grade.

Exams

In-class Closed-book Quizzes (ICQ): ICQs will be delivered as 20 to 30 minutes activities as blocks of contents are completed; e.g.: After basics of electricity are completed (around the 4th or 5th week) a test may be expected in the following week. If times allows, the ICQs will be done in class, otherwise they will be administered online under strict timing (25 minutes). These tests will represent **25%** of the final grade.

Final Exam and Performance Test (PT): The Final Exam will cover the totality of the course and includes the Performance Test (PT) is an activity in which students will perform the tasks needed to complete an Energized Electrical Work Permit. The final exam + PT accounts for **25%** of the final grade **and it must be at least 60% correct**. Not taking the final exam, or having an F as grade, automatically disqualifies the student (who will fail the course). Only in very special cases a student that misses the final exam will receive an incomplete grade (IF or ID) in order to give him/her the opportunity to take the exam another day. Failing to do so will grant an automatic F or D.

In summary:

OOQ	**25%**
Homework	**25%**
ICQ	**25%**
Final Exam (+ PT)	**25%**

Grades: The grading scale is as follows:

A = 90 to 100%
B = 80 to 89%
C = 70 to 79%
D = 60 to 69%
F = 0 to 59%

Keys for success

- Do your best taking notes throughout the class. Please be generous and share your notes after class with others not so gifted at taking notes. If needed, there is Xerox machine in Sierra Hall 235 (second floor) that can be used with a Pirate's Prepaid Card.
- The OOQs are in the handouts delivered at the beginning of the class, it's acceptable to answer the questions as the lecture progresses. OOQs are no more than 7 questions long, mainly multiple choice and filling in the blank, and less than 7 questions if they require some calculations. Students will be given 3 to 5 minutes to answer, a little more if calculations are involved, which will be plenty. Mind your notes, the class will be supported with handouts or screenshots.
- Hand-outs are small reproductions of some of the slides, charts, or pictures that will be used during the class. Sometimes they will be just a blurred image, so a reference source will be provided so they can be retrieved, and/or they will be posted on CANVAS so they can be magnified. Mind your notes, use the handouts as visual reminders of "moments" along the lecture. Also, group the summaries at the end of each handout. They together are a synthesis, a 360º view, of Electrical Safety.
- Take care of the homework as soon as it is assigned. Give a general skim to the HW questions; that will make your reading more effective. Reading will be based on Managing Electrical Hazards from NCCER, the old 2004 Bussmann's Basic's Safety, OSHA 1910 Subpart S, and some other materials that will be recommended in class. Keep the HW questions open and answer the questions as soon as you find the key paragraphs that are related to the point. If a question is of the "short answer" type, summarize the main points.

- When reading, don't be afraid of marking the text - highlight key words or concepts, write in the margin questions that you may like to ask next class, and write short summaries or conceptual maps. Keep books, handouts, and notes together. Organize notes and handouts by class and topic.
- Keep track of grades, so you will have a good idea of your progress and you'll know the areas that you need to work on.
- It is a very good idea to organize a study group and plan review sessions to get ready for the exams.
- Formal education, such as this class, is a short term commitment with long term consequences. Some family matters – little league, Halloween, a fishing trip, etc… - may need to take the back seat for a while. It is up to the instructor to do the upmost to deliver good content, but up to the student to achieve success.

This is a tentative schedule for a 16-week course schema.

WEEKS (aprox.)	THEMES	READING		ASGMNT
1 THR. 5	Basic Electrical Variables, Ohm's Law, Electrical Power and Energy, Electrical Shock and Flash, Basic Short Circuit Estimation, Protective Devices, Grounding.	MEH Section 1 2	Safety Basics and Other V VI	Module 1
6 and 7	Regulations and Regulatory Agencies. Standards and Standard Development Organizations. Scope, Description, and Relationship between of Standards and Regulations: OSHA 1910 Subpart S, OSHA 1926 Subpart K, and NFPA 70E. Electrical Safety Programs.	4 10 11	II III VIII	Module 2
8	Control of Hazardous Energy. Electrically Safe Work Condition. Lock Out/ Tag Out General Procedures.	9	1910.147 (excerpt) 1910.333(b) NFPA 70E 120	Module 3
9 and 10	Shock Risk Analysis. Interpretation and Application of OSHA 1910.333, NFPA 70E 130.4, and Related Articles and Annexes.	7 3	1910.333(c) NFPA 70E 130	Module 4
11 THR. 13	Flash Risk Analysis. Interpretation and Application of NFPA 70E 130.5, 6, 7, and Related Articles and Annexes.			Module 5
14 and 15	Study Cases. Energized Electrical Work Permits. Other Safety Considerations.	5 8 6	Study Case	Module 6
16	FINAL EXAM			