FLORIDA INTERNATIONAL UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
EEL-5270 Electrical Transients in Power Systems
SPRING SEMESTER 2017
INFORMATION SHEET AND COURSE TOPICS

COURSE INSTRUCTOR:

Professor Osama A. Mohammed, Ph.D., Fellow IEEE
Energy Systems Research Laboratory
Department of Electrical & Computer Engineering
Room EC-3983
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Class Time/Room: F: 2:00-4:30 pm, EC-2410

OFFICE: EC-3983

Office hours F 1:00-2:00 pm

PHONE: (305) 348-3040/2807 (office/staff)

PRE-REQUISITE: EEL-4213 or permission of instructor.

CREDIT HOURS: 3 Hours

TEXT_BOOK AND NOTES:

1. Electrical Transients in Power Systems by Allan Greenwood, Wiley, 1994.
2. Selected lecture notes by Professor Mohammed and other demonstration material and examples will be made available at the above Web site and/or in class.

Who Should Take This Course?

- FIU Electrical and Computer Engineering Students who took EEL4213 (power I) and Graduate Students.
- Students at other Universities in Florida or out of State with the course's prerequisites.
- Engineers and technical personnel in Industry preparing for Engineering License
- Engineers and technical staff who want to keep current and reach a deep understanding of energy conversion concepts.

Objectives:

1. Introducing Electrical Transients in power systems
2. Cover the concepts of traveling waves and propagation
3. Modeling of transmission lines as distributed parameter systems.
4. Discuss issues related to insulation coordination, grounding and limiting of surge effects
5. Develop techniques related to reflections at transition points in lines and cables
6. Multi conductor transients and distributed parameter modeling for components and shielding issues.
7. Involve students in a practical experience through the term project.

Course topics:

- Introduction to Electrical Transients in Power Systems (Circuit opening and closing transients, Recovery transients.
- Traveling waves on Transmission Systems (Propagation of Surges)
- Modeling of Transmission Lines by Distributed Parameter Concepts (Lossless cases, loss cases, distortion-less cases, Lines with small losses)
- Distortion due to Corona
- Energy in Traveling Waves
- Characteristics of Traveling Waves (wave shapes, standards, impulse and switching surges, lightning, Basic Impulse Insulation Level (BIL), Flashover surge generators)
- Analytical approximation of Surge Wave Shapes
- Transition Points (Lines, Cables, Voltage Buildup, various types of Transition points, termina*tions*)
- Lumped Series and Shunt Impedance Transition Points (Junctions at Cables, Substations
- Dissimilar Voltage and Current Surges
- Surge Arresters (Linear and Nonlinear Characteristics.
- Successive Reflections on Transmission Systems
- Grounding
- Insulation Coordination
- Multi-Conductor, Multi-velocity Systems
- Transient Performance of Distributed parameter Systems for Transformer, Generator and Motor Windings
- Shielding
- Practical Examples, projects

References:

Appropriate lists and copies of technical papers will be distributed or listed for your collection. A list of recent text-books and other technical record will be suggested to you. However, you are also required to research and obtained other pertinent materials related to the topics covered.

ASSISTANCE: Please try to see Dr. Mohammed during his listed office hours or through the communication forum on the web page. If this proves impossible, a personal appointment should arranged by calling my direct phone number or the ECE department secretary at extension (305-348-2807).

ABSENCE: Class attendance (physical or virtual) is very important and is considered in your overall performance in the course. Students are responsible for all material covered in that class.

IMPORTANT RULE: Students are encouraged to discuss the course topics with the professor and with each other. Any work submitted (Homework, Tests, projects, etc.) should be pledged and signed as the students' own work, and that there is no any unauthorized help was obtained. Violators will be subject to academic misconduct, which might lead to dismissal from the university.

GRADING POLICY:

Homework will be assigned regularly, collected and graded. Efforts in homework indicate that you are studying and caring about the course and therefore can have an impact on your final grade. Time for the mid-term will be announced one week in advance. **Any work submitted must be neat and detailed for partial mark.** Your Grade will be calculated as Follows:

Homework and Class Projects	**20%**
Mid Term	**25%**
Term Project/Research Paper	**20%**
Final Exam	**35%**
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Total	**100%**

TERM PROJECT:

The project will involve one or more of the topics of this course. Final presentation (oral and written) of the overall project results will be required. Software available for this class can be utilized for the projects.