

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE OUTLINE: ELECTRICAL POWER SYSTEMS  
CODE NO.: ELR 215-3  
PROGRAM: ELECTRICAL TECHNICIAN/TECHNOLOGY  
SEMESTER: THREE  
DATE: MAY 31, 1991  
PREVIOUS  
OUTLINE DATED: AUGUST 27, 1990  
AUTHOR: R. MCTAGGART

NEW: \_\_\_\_\_ REV.:  X

APPROVED:

W. Filipowich  
COORDINATOR

June 1/91  
DATE

J.P. Crockett  
DEAN

\_\_\_\_\_  
DATE



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TOTAL CREDIT HOURS: 48

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PREREQUISITE(S): ELR 109

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**PHILOSOPHY/GOALS:**

THIS COURSE IS A STUDY OF THE PRODUCTION AND DELIVERY OF ELECTRICAL POWER FROM THE GENERATING STATION TO THE CONSUMER. TRANSMISSION AND DISTRIBUTION EQUIPMENT, SYSTEM CONFIGURATIONS, PROTECTION AND CONTROL, AND ELECTRICAL LOAD FUNDAMENTALS WILL BE DISCUSSED AND ANALYZED.

**STUDENT PERFORMANCE OBJECTIVES:**

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. DISCUSS VARIOUS OPTIONS AVAILABLE FOR GENERATING ELECTRICITY;
2. IDENTIFY AND HAVE A BASIC UNDERSTANDING OF EQUIPMENT ASSOCIATED WITH THE GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY;
3. IDENTIFY AND HAVE A BASIC UNDERSTANDING OF VARIOUS TRANSMISSION AND DISTRIBUTION SYSTEM CONFIGURATIONS AND FUNDAMENTALS;
4. PERFORM SIMPLE FAULT ANALYSIS AND PROTECTIVE RELAY COORDINATION;
5. HAVE A BASIC UNDERSTANDING OF LOAD FLOW CONCEPTS.

**TOPICS TO BE COVERED:**

1. POWER SYSTEM FUNDAMENTALS.
2. ELECTRICAL POWER PLANTS.
3. POWER TRANSMISSION.
4. SUBSTATIONS.
5. POWER DISTRIBUTION.
6. UTILIZATION OF ELECTRICITY.
7. GROUNDING.
8. POWER SYSTEM FAULT ANALYSIS.
9. SYSTEM CONTROL AND LOAD FLOW.



## LEARNING ACTIVITIES

1. POWER SYSTEM FUNDAMENTALS
  - INTRODUCTION TO POWER SYSTEM COMPONENTS
  - PER UNIT SYSTEM
  - ANALYSIS OF POWER SYSTEMS USING THE PER UNIT SYSTEM
2. ELECTRICAL POWER PLANTS
  - FOSSIL FUEL
  - HYDROELECTRIC
  - NUCLEAR
  - ALTERNATIVE POWER SOURCES
3. POWER TRANSMISSION
  - TRANSMISSION SYSTEM COMPONENTS
  - AC TRANSMISSION
  - DC TRANSMISSION
4. SUBSTATIONS
  - TRANSMISSION SUBSTATIONS
  - DISTRIBUTION SUBSTATIONS
5. POWER DISTRIBUTION
  - DISTRIBUTION SYSTEM COMPONENTS
  - DISTRIBUTION SYSTEM FUNDAMENTALS
6. UTILIZATION OF ELECTRICITY
  - INDUSTRIAL
  - COMMERCIAL
  - RESIDENTIAL
  - ONTARIO HYDRO CODE BOOK
  - CANADIAN ELECTRICAL CODE
7. GROUNDING
  - REASONS FOR GROUNDING
  - GROUNDING METHODS AND DESIGN
8. POWER SYSTEM FAULT ANALYSIS
  - TYPES OF FAULTS
  - FUSES
  - PROTECTIVE RELAYING
  - CIRCUIT BREAKER CONTROL CIRCUITS
  - FAULT COORDINATION
9. SYSTEM CONTROL AND LOAD FLOW
  - CONTROL OF POWER AND FREQUENCY
  - CONTROL OF VOLTAGE AND REACTIVE POWER
  - LOAD FLOW



ELECT. POWER SYSTEMS  
COURSE NAME

ELR 215  
CODE NO.

---

**RESOURCE MATERIALS: AVAILABLE FROM INSTRUCTOR.**

BASIC ELECTRICAL POWER DISTRIBUTION VOL.1, A. J. PANSINI.  
BASIC ELECTRICAL POWER DISTRIBUTION VOL.2, A. J. PANSINI.  
ELECTRICAL ENERGY CONVERSION AND TRANSMISSION, S. NASAR.  
ELECTRIC POWER SYSTEMS, B. M. WEEDY.  
ELECTRICAL POWER SYSTEMS TECHNOLOGY, FARDO & PATRICK.  
ELECTRICAL POWER TECHNOLOGY, T. WILDI.  
ELECTRIC POWER TRANSMISSION SYSTEMS, J. R. EATON.  
ELEMENTARY ELECTRICAL ENGINEERING, C. R. DARGAN.  
ELEMENTS OF POWER SYSTEM ANALYSIS, W. D. STEVENSON, Jr.  
POWER SYSTEM OPERATION, R. H. MILLER.  
ONTARIO HYDRO ELECTRICAL SAFETY CODE.



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ELR 215  
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METHOD(S) OF EVALUATION

TESTS	75%
REPORT/ESSAY	25%
TOTAL	100%

THE GRADING SYSTEM USED WILL BE AS FOLLOWS:

A+ = 90 - 100%    A = 80 - 89%    B = 70 - 79%    C = 55 - 69%  
R REPEAT

NOTES: IF A STUDENT MISSES A TEST HE/SHE MUST HAVE A VALID REASON (ie. MEDICAL OR FAMILY EMERGENCY). IN ADDITION THE SCHOOL MUST BE NOTIFIED BEFORE THE SCHEDULED TEST SITTING. THE STUDENT SHOULD CONTACT THE INSTRUCTOR INVOLVED. IF THE INSTRUCTOR CANNOT BE REACHED LEAVE A MESSAGE WITH THE DEAN'S OFFICE OR THE COLLEGE SWITCHBOARD. IF THIS PROCEDURE IS NOT FOLLOWED THE STUDENT WILL RECEIVE A MARK OF ZERO ON THE TEST WITH NO REWRITE OPTION.

REQUIRED STUDENT RESOURCES:

TEXT BOOKS: THE INSTRUCTOR WILL PROVIDE RESOURCES IN ADDITION TO THOSE IN THE COLLEGE LIBRARY.

ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

BASIC ELECTRICAL POWER DISTRIBUTION, A. J. PANSINI.  
BASIC ELECTRICAL POWER TRANSMISSION, A. J. PANSINI.  
ELECTRICAL DISTRIBUTION ENGINEERING, A. J. PANSINI.  
ELECTRIC POWER DISTRIBUTION SYSTEM ENGINEERING, T. GONEN.  
ELECTRIC POWER: CHALLENGES AND CHOICES, A. WYATT.  
ELECTRIC POWER SYSTEMS, B. M. WEEDY.  
ELECTRICAL POWER TECHNOLOGY, T. WILDI.  
ELECTRICAL TRANSMISSION AND DISTRIBUTION, WESTINGHOUSE.  
ELECTRIC UTILITY SYSTEMS AND PRACTICES, H. M. RUSTEBAKKE.  
HANDBOOK OF ELECTRIC POWER CALC., SEIDMAN & MAHROUS.  
POWER SYSTEM OPERATION, R. H. MILLER.  
PROTECTIVE RELAYS: THEIR THEORY AND PRACTICE, WARRINGTON.  
STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS, FINK & BEATY.  
SWITCHGEAR AND CONTROL HANDBOOK, R. W. SMEATON.

SPECIAL NOTES: