

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: BUILDING SCIENCE II  
Code No.: PHY 12 6-5  
Program: ARCHITECTURAL TECHNICIAN  
Semester: II  
Date: JANUARY, 1993  
Author: M, URSELL

New: Revision

APPROVED: Chairperson Date

BUILDING SCIENCE II

PHY 126-5

Course Name

Course Number

PHILOSOPHY/GOALS:

To understand, design and layout of basic electrical installations.

To understand, design and layout of illumination systems.

To understand, design and layout of acoustic installations.

To utilize the microcomputer in the independent design of illumination and acoustic installations.

METHOD OF ASSESSMENT

SEE ATTACHED SHEET.

TEXTBOOK(S):

Mechanical & Electrical Equipment for Buildings - McGuiness & Assoc.

METHOD OF ASSESSMENT (all courses):

The following grades will be assigned:

|                |   |
|----------------|---|
| A - 75 - 100%  | consistently above average achievement  |
| B " 66 - 74%   | average achievement   |
| C - 55 - 65%   | satisfactory achievement  |
| I - incomplete |   |
| R ~ Repeat     | the student has failed to achieve the objectives of the course and must repeat the course |

The "I" grade (incomplete) designation indicates that the student has not completed the objectives required in specific course areas.

Semester work will be made up of four tests and assignments. All tests and assignments must be completed when assigned. Late assignments or projects will not be tolerated.

Attendance is also mandatory in all classes.

Tests and assignments will be given on a regular basis throughout the semester. The weighted grade between practical theoretical work will depend on the type of course. Final examinations are also mandatory for any student that does not maintain an "A" average in the course or who has not completed all assignments by their due date.

NOTE: Chronic absenteeism by any student will result in the student not being admitted to class and ultimately his failure to receive an acceptable grade in the course.

TEXTS:

Mechanical and Electrical Equipment for Buildings, 5th Edition  
- by William J. McGuiness, Benjamin Stein & Associates

REFERENCE TEXTS:

Building Construction Handbook - by Merritt (McGraw-Hill)

Acoustics in Modern Practice - by Fritz Ingerslav (Architectural Press)

Architectural and Building Trades Dictionary - by Burke Dalsell, Townshe  
(General Publishers)

Architectural Graphic Standars - by Ramsey and Sleeper (General Publishers)

Design of Good Acoustics - by J.E. Moore (Architectural Press)

Building Physics - Acoustics - M.J. Purkis (Pergamon Press)

Acoustics Design ^ Noise Control - Chemical Publishing Co.

Metric Practice Guide - HRA

Ontario Electrical Safety Code

Architectural Acoustics - by Bruel & Kjaer

International ^ Metric Units of Measurement - Publisher "The Chemical  
Publishing Company"

BUILDING SCIENCE II

PHY 126-5

| TOPIC NO. | PERIOD | TOPIC DESCRIPTION   | REFERENCE |
|-----------|--------|---|-----------|
| 1.        | 26     | Electrical Installations<br>electrical terminology<br>basic electrical circuits<br>domestic wiring installations<br>hydro electric code regulations<br>- generators<br>- motors, etc,<br>electrical one line circuit layout plans<br>true wiring diagrams<br>system components  |           |
|           | 22     | Illumination<br>terminology<br>units of measurement<br>design problems - Zonal Cavity Method<br>various lighting systems<br>history of lighting<br>the office environment and lighting<br>lighting layout plans<br>light and colour<br>supplementary and general lighting techniques  |           |
|           | 16     | Acoustics<br>by point method of lighting design<br>terminology<br>the physics of sound<br>units of measure<br>design for optimum acoustics<br>reverberation<br>treatment of reflected sound<br>treatment of impact sound<br>treatment of sound transmission between spaces<br>acoustic materials and applications<br>measurement techniques |           |

## ARCHITECTURAL TECHNICIAN II

### PHY 126

#### Performance Objectives for Building Science II:

The general objective of this course is to interrelate architecture and engineering in building design and construction- The student shall become knowledgeable in the design of electrical services, illumination and acoustics for buildings. He shall also be expected to graphically express his design concepts to proper technical drawing standards.

The Specific Objectives of the course are as follows:

1. To identify and relate the electron theory of matter.
2. To identify and relate electrical terminology such as ampere, voltage resistance, power, etc.
3. To identify the basic electrical formulas.
4. To solve problems related to the use of OHEM's law.
5. To solve problems related to power.
6. To identify a D.C. generator.
7. To identify an A.C. generator.
8. To understand and to relate to others the operation of a D.C. generator.
9. To understand and to relate to others the operation of an A.C. generator.
10. To identify and draw a parallel circuit.
11. To identify and draw a schematic for a single phase distribution panel.
12. To identify and draw a series circuit.
13. To solve series and parallel circuit problems.
14. To identify various types of current flow.
15. To identify the various electrical symbols used on electrical layout drawings.
16. To identify the various electrical symbols used in domestic wiring installations.

17. To understand the characteristics and uses of the various electrical components used in commercial installations.
18. To identify a true wiring diagram.
19. To identify a one-line wiring diagram.
20. To solve true-wiring circuit problems.
21. To layout a one-line circuit drawing for a domestic building,
22. To identify the requirements for good wiring practice.
23. To identify a general purpose circuit.
24. To identify a small appliance circuit,
25. To identify an individual or private circuit.
26. To identify an auxiliary circuit,
27. To identify and relate the H.E.C. regulations for general wiring practice as applied to domestic and commercial installations.
28. To identify the proper current carrying capacities of various wire sizes and types.
29. To identify the proper conduit size for the various wire sizes and types
30. To draw a block diagram showing the distribution of power from the generating station to the consumer service.
31. To identify the systems of A.C. voltage such as:
  - a) Three phase 4-wire connection
  - b) Three phase "delta" systems
  - c) Single phase transformer connections.
32. To draw a riser diagram for a small apartment block.
33. To solve service calculations for a small apartment block.
34. To complete a wiring layout for a small apartment block.
35. To make all schedules required for the above project.
36. To identify the true wiring symbols used on electrical drawings,
37. To identify the various electrical components used in domestic electrical installations.

PART 2 Z Illumination

38. To identify the terminology used in illumination design,
39. To understand the reasons for optimum illumination design.
40. To identify the requirements for good visual acuity.
41. To identify the formulas used in illumination design.
42. To solve illumination problems by employing the "Zonal Cavity Method".
43. To identify the problems associated with reflection.
44. To solve problems associated with reflection,
45. To determine reflection factors for various conditions.
46. To investigate the use of a light meter in illumination design.
47. To determine effective cavity ratios.
48. To identify and to relate to others the characteristics of the different general lighting systems.
49. To identify and to relate to others the characteristics of various light sources.
50. To solve fixture layout problems.
51. To solve general lighting problems.
52. To solve supplementary lighting problems.
53. To understand and to relate to others the effects of light on colour
54. To complete a research assignment or existing lighting levels and systems and to suggest corrections.
55. To select proper light sources for various lighting requirements.
56. To solve lighting design problems by the use of the microcomputer.

PART 2 Z Acoustic

57. To identify the terminology used in acoustic design.
58. To identify the factors involved in acoustic control.
59. To understand the two main areas of design for optimum acoustics.



60. To research the history of acoustics as a science.
61. To understand the action of sound in an enclosed space.
62. To identify reverberation.
63. To identify frequency and wave length.
64. To identify velocity.
65. To identify magnitude.
66. To identify the requirements of a good sound absorber.
67. To identify the decibel.
68. To solve problems involving the decibel.
69. To identify the "sabine" formula for reverberation control.
70. To solve acoustic problems involving reverberation within a space.
71. To identify and know the application of various commercial sound absorbing materials.
72. To identify and construct a custom resonator panel.
73. To identify and understand the control of sound transmission between spaces,
74. To identify the N.R.R. of various walls and partitions.
75. To solve problems related to sound control within a space and between spaces.
76. To identify the difference between a pure tone, noise and music.
77. To identify methods and material used in treating and reducing impact sounds.
78. To identify the acoustical uses of wood.
79. To identify the acoustical uses of lead.
80. To identify the acoustical uses of light-weight concrete, etc.
81. To research the psychological aspects of sound control and/or background noise.
82. To inspect methods of sound measurement.
83. To solve acoustic design problems independently on the microcomputer.