

References

Textbook references

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Codes and Standards

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Safety Design Documents

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NAT85a A. Natalizio, "CANDU Safety Report", IAEA Training Course on Safety Review and Assessment for Construction Permit, Lecture L2.5, Ankara, Turkey, September 9 - October 4, 1985.

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NATH85 V. NATH, "CANDU Safety Analysis - LOCA", IAEA Training Course on Safety Review and Assessment for Construction Permit, Lecture L2.6 (material prepared by V. Snell), Ankara, Turkey, September 9 - October 4, 1985.

TIN90 E. Tin, "Wolsong-2 Licensing Basis Document", CANDU Training Course on NSSS Design and Analysis, Lecture 6.5, December 4, 1990.

SHA90 H. Shapiro, "Fault Tree Symbology and Construction", CANDU Training Course on NSSS Design and Analysis, Lecture 11.2, December 10, 1990.

WAS75 "Reactor Safety Study, An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants", U.S. Nuclear Regulatory Commission Report WASH-1400, NUREG 75/014, October 1975.

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**Nuclear Reactor Safety Design
Detailed Outline and Schedule
for Two Week Intensive Course
February 1998**

Day 1 February 16

1. Admin and course overview
 - a. Sign in and introduction
 - b. What this course is about and how we will proceed
 - c. Learning outcomes
 - d. Course outline and schedule handouts
 - e. Out of class contact
 - f. Reading assignment: Chapter 1
 - g. Announcements
2. Course Overview (Chapter 1)
 - a. Risk
 - b. Simple example
 - c. Safety methodology
3. Workshop activities (5% of final mark)
 - a. Concept map
 - b. Risk preference
 - c. Reading assignment: Chapter 2 (sections 1 to 9)

Day 2 February 17

4. Discussion of workshop activity results
5. Probability Tools and Techniques (Chapter 2)
 - a. Definitions and rules
 - b. Bayes equation
 - c. Example: core monitoring system
 - d. Failure rate estimation
 - e. Probability distributions
 - f. Demand systems
 - g. Failure dynamics
 - h. Repair
6. Workshop Activities (5% of final mark)
 - a. Probability exercises
 - b. Reading assignment: Chapter 2 (sections 10 to end)

Day 3 February 18

7. Discussion of workshop activity results

8. Probability Tools and Techniques (Chapter 2 continued)
 - a. Example: shutdown system
 - b. Fault tree example
 - c. 2/3 logic
 - d. Ladder logic
 - e. Unavailability targets
9. Workshop Activities (5% of final mark)
 - a. Probability examples
 - b. SDS calculation for MNR (time permitting)
 - c. Reading assignment: Chapter 3

Day 4 February 19

10. Discussion of workshop activity results
11. MNR
 - a. System description
 - b. Project outline
12. Workshop Activities (5% of final mark)
 - a. Project planning
 - b. Catchup time for previous assignments

Day 5 February 20

13. Discussion of workshop activity results
14. Safety Criteria (Chapter 3)
 - a. Safety goals
 - b. Deterministic approach
 - c. NRX accident
 - d. Single / dual mode failures
 - e. C6
 - f. Current practice
15. Workshop Activities (10% of final mark)
 - a. Summarize chapter on a concept diagram
 - b. Project time
 - c. Reading assignment: Chapter 4 and 5

Day 6 February 23

16. Discussion of workshop activity results
17. PSA (Chapters 4 and 5)
 - a. Design Basis Accidents
 - b. Event Trees
 - c. Fault Trees
18. Workshop Activities (10% of final mark)
 - a. DBA for MNR

- b. Assign DNAs to event classes
- c. ET for deer avoidance example
- d. SDS FT for MNR
- e. Start working on IE and FT for 4 main events for MNR
- f. Reading assignment: Chapters 6, 7 and 8

Day 7 February 24

- 19. Discussion of workshop activity results
- 20. Safety Analysis (Chapter 6)
- 21. Safety Systems (Chapter 7)
- 22. Good Design Practice (Chapter 8)
- 23. Workshop Activities (10% of final mark)
 - a. Calculate iodine activity
 - b. Question of functional requirements
 - c. Continue working out ET and FT for 4 main events
 - d. Catch up time

Day 8 February 15

- 24. Discussion of workshop activity results
- 25. Final exam (50% of final mark)

Project Outline:

- 1. MNR description (in class)
- 2. Set safety goals
- 3. SDS fault tree
- 4. Design basis accidents
- 5. Event trees and supporting fault trees for 4 main events:
 - a. LOCA
 - b. LOR
 - c. Loss of flow
 - d. Flow blockage