Session 1

A. Administrative

1. Welcome
   - Introduction of Instructors
   - Students introduce themselves
2. UNENE Issues
   - Registration for courses
   - Payment of fees
   - Future courses
3. Reactor Physics Course Arrangements
   - Course days/times/rooms & locations- Module I
   - Course days/times/rooms & locations- Module II
   - Date of final exam
   - Rooms & locations
   - Lunches, Breaks
   - Washrooms
   - Use of Computers
4. Evaluation
   - 5 problem sets total 10%
     - Due Sat. & Sun. morning, Module I
     - Due Fri., Sat & Sun morning Module II
   - Short Report on Technical Topic 20%
     - Due first morning of Module II
     - Presentation to be made in Session 13/14
   - Multiple-choice test 20%
     - 50 qualitative multiple-choice questions
     - Last day/session of Module II
     - 1.5 hrs
   - Final Exam 50%
     - Date to be set in Dec 2003 or Jan 2004
     - Numerical reactor-physics problems
5. Learning Materials
   - Course web site http://nuceng.mcmaster.ca/ep6d3/ep6d3home.htm
   - Notes on Course web site
   - Book by A.A. Harms, *Principles of Nuclear Science and Engineering,* John Wiley & Sons, 1987, reprinted in the McMaster Course Ware ($19.95)
   - Book by H. Tammemagi and D. Jackson, "*Unlocking the Atom: the Canadian Book on Nuclear technology"*, McMaster University Press, 2002 ($40.00)
   - Chart of the isotopes ($1.50)

6. Course Outline
    - Course objectives:
        - To review and understand the fundamental physics underlying nuclear technology to ensure a solid basis for the other UNENE courses.
        - To survey general knowledge and acquire a context and perspective on all aspects of nuclear engineering.
        - To learn the essential physical principles on which nuclear reactors are based and to be able to apply them to understand, calculate and predict the operation of reactors.
    - Learning Outcomes
        - To understand the physical processes
        - To understand and be able to write down the basic equations
        - To be able to solve the basic equations
        - To be able to simulate a reactor/source configuration as appropriate in terms of : number of dimensions, steady state of transient operation, number of neutron energy groups, delayed precursors, space dependent properties and grid spacing
    - Session length 1.5 hours (=1 Golubchikov)
    - 24 sessions
    - discussion of the main points of the outline
        - flux, cross sections, delayed neutrons, burnup, Xenon, kinetics

B. Introduction to Nuclear Energy

**[Harms, Chapter 1, pp. 1-14]*

- Einstein & his equation
- mass-energy equivalence $E=mc^2$
- energy intensity ***[Unlocking, Chapter 5, pp.55-71]*
- mass-energy conservation – nuclear reactions
- electron volts as a unit
- energy, power and reactions

NOTES:

**[Harms, Chapter 1, pp. 1-14]* means Chapter 1 pages 1-14 of the book by A.A. Harms, *Principles of Nuclear Science and Engineering,* John Wiley & Sons, 1987, as reprinted in the Course Ware

*** [Unlocking, Chapter 5, pp.55-71]* means Chapter 5, pages 55-71 of H. Tammemagi and D. Jackson, *Unlocking the Atom,* McMaster University Press, 2002