

UNENE Graduate Course Reactor Thermal-Hydraulics Design and Analysis

McMaster University

Whitby

March 19-21, April 23-25, May 2, 2004

Dr Nik Popov

Dr Bill Garland

Dr Laurence Leung

Course Schedule (March 19)

Class Topic	Lecturer Name	Lecture Time
1.Course introduction:	Nik Popov	9:00 – 10:00
2.Design Requirements	Nik Popov	10:00 – 12:00
3.Power reactor types and designs 4.Process Design Evolution	Nik Popov	13:00 – 15:00
5.Heat Transport System Thermal-Hydraulics	Bill Garland	15:00 – 18:00

Course Schedule (March 20)

Class Topic	Lecturer Name	Lecture Time
6.Flow instabilities	Nik Popov	9:00 – 10:00
7.Fuel-coolant heat transfer	Bill Garland	10:00 – 12:00 13:00 – 14:00
8.Reactor Thermodynamics	Laurence Leung Nik Popov	14:00 – 18:00

Course Schedule (March 21)

Class Topic	Lecturer Name	Lecture Time
9. Two-Phase Flow Fundamentals and impact on the design process	Laurence Leung	9:00 – 11:00
10. Critical Heat Flux 11. Post dryout heat transfer	Laurence Leung	11:00 – 12:00 13:00 – 16:00
12. Pressure drop	Laurence Leung	16:00 – 17:00
13. Assignments	Nik Popov	17:00 – 18:00

Course Schedule (April 23)

Class Topic	Lecturer Name	Lecture Time
14. Assignments - student presentations	Nik Popov	9:00 – 12:00
15. Basic equations for t-h analysis	Nik Popov	13:00 – 15:00
16. Equation of state	Bill Garland	15:00 – 17:00

Course Schedule (April 24)

Class Topic	Lecturer Name	Lecture Time
17. Nodalization	Bill Garland	9:00 – 11:00
18. The rate form of equation of state	Bill Garland	11:00 – 13:00
19. Review of computer programs (CATHENA, TUF, ASSERT, MODTUR-CLAS, etc)	Nik Popov	14:00 – 16:00
20. Thermal-hydraulic network calculations	Nik Popov	16:00 – 17:00

Course Schedule (April 25)

Class Topic	Lecturer Name	Lecture Time
21. CATHENA t-h models	Nik Popov	9:00 – 12:00 13:00 – 14:00
22. Preparation for the test	Nik Popov Bill Garland	14:00 – 15:00

Course Schedule (May 2)

Class Topic	Lecturer Name	Lecture Time
23. Final test	Nik Popov Bill Garland	9:00 – 12:00

Course Preliminaries

- UNENE TH Course is being given the first time
 - ◆ Composed from material used in the past – McMaster Nuclear Technology Graduate Diploma Program
 - ◆ EP716 – Reactor TH Design
 - ◆ EP718 – Reactor TH Analysis
 - ◆ Course in development, experience from this semester will be taken into consideration for preparing the course for next year
- Course material contains more information that can be covered in 6 x 8 hours over two weekends
- Course material available on the web site
 - ◆ <http://nuceng.mcmaster.ca/ep704th/ep704index.htm>.

Course Preliminaries (cont'd)

■ Course format

- ◆ Lectures, assignments, test at the end
- ◆ Student participation in discussions encouraged and important
- ◆ Material on the web site will not be covered in class on page-by-page and line-by-line basis, instead informal discussions will be encouraged
- ◆ Student suggestions and preferences will be taken into account as much as possible and feasible
- ◆ Student presentations on specific topics will be considered in the 2nd session (second weekend)

Assignments

- Main assignment
 - ◆ Comparison of reactor types CANDU 6, ACR, Advanced PWR
 - ◆ Details will be explained at the end of the 1st session
 - ◆ Assignment to be ready at the first class of 2nd session
 - ◆ Students will be grouped in 4 groups
 - ◆ Student presentation for each group are scheduled at the beginning of 2nd session
- Several minor assignments will also be given that will be completed either in class or at home

Test

- Open book test scheduled for May 2, 2004
 - ◆ Students will be allowed to prepare up to 10 pages of material to use for the test (other textbooks or material will not be allowed)
- Test will include questions that cover most important parts of the course
- Calculations will not be included, but explaining calculation methodology may be
- Formula derivation will be avoided

Marks

- Mark composed of:

◆ Main assignment	30%
◆ Presentation	15%
◆ Paper	15%
◆ Small assignments	30%
◆ Class participation	10%
◆ Test	30%

- Marks will be given to McMaster one week after the Test (by May 10).

Graduate Marks

■ McMaster University Marks

◆ A+	90 – 100%
◆ A	85 – 89%
◆ A-	80 – 84%
◆ B+	77 – 79%
◆ B	73 – 76%
◆ B-	70 – 72%

Questions?