NPRE412: Nuclear Power Economics and Fuel Management

University of Illinois, Urbana-Champaign

Fall 2016

Instructor:	Prof. Kathryn Huff	**Time:**	MWF 10:00am– 10:50am
Email:	kdhuff@illinois.edu	**Place:**	106B3 Engineering Hall

Course Pages:

1. http://katyhuff.github.io/NPRE412

2. http://yourWebPage2.com/teaching

Office Hours: Fridays from 3-5 pm. If you have an individual issue, please make an appointment. If your colleagues might be helpful, please post your questions in the forum provided for this purpose online rather than attending office hours.

Main References: A few essential references for this course are listed below. The recommended course for this text is [1]..

[1] Nicholas Tsoulfanidis. *The Nuclear Fuel Cycle*. American Nuclear Society, La Grange Park, Illinois, USA, 2013. 00177. 1

[2] Richard Rhodes. *The Making of the Atomic Bomb: 25th Anniversary Edition*. Simon & Schuster, New York, anv rep edition edition, June 2012.

[3] Comparison of Small Modular Reactor and Large Nuclear Reactor Fuel Cost. *Energy and Power Engineering*, 6(05):82, 2014.

[4] N. Tsoulfanidis, R.G. Cochran, E.E. Lewis, and W.F. Miller. *The nuclear fuel cycle: analysis and management*. American Nuclear Society, 1990.

[5] Pavel Tsvetkov. *Nuclear Power - Deployment, Operation and Sustainability*. InTech, September 2011. 00000.

Objectives: This course will equip students to:

- Quantitative analysis of the impact of the nuclear power industry;

- nuclear fuel cycle and capital costs for thermal and fast reactors;

- optimization of the use of nuclear fuels to provide the lowest energy costs and highest system performance;

- differentiate among features of fossil fuel systems, fission systems, and controlled thermonuclear fusion systems.

- ¡+objective+¿

- ¡+objective+¿

- ¡+objective+¿

Prerequisites:

- ¡+standing+¿ standing is required.

- ¡+required courses+¿

- ¡+other+¿

Course Schedule: *Note that this schedule is subject to change*

Grading Policy: Grades will be assigned as a weighted sum of the following work.

Important Dates:

$$\begin{array}{ll}
\text{Midterm \#1} \ldots\ldots\ldots\ldots & \text{10:00-10:50am, October 3, 2016} \\
\text{Midterm \#2} \ldots\ldots\ldots\ldots & \text{10:00-10:50am, November 7, 2016} \\
\text{Final Exam} \ldots\ldots\ldots\ldots & \text{1:30-4:30pm, December 14, 2016}
\end{array}$$

Class Policies:

Integrity: This is an institution of higher learning. You will be swiftly ejected from the course if you are caught undermining its integrity. Note the Student's Quick Reference Guide to Academic Integrity and the Academic Integrity Policy and Procedure.

Attendance: Regular attendance is mandatory. Request approval for absence for extenuating circumstances prior to absence.

Electronics: Active participation is essential and expected. Accordingly, students must turn off all electronic devices (laptop, tablets, cellphones, etc.) during class. Exceptions may be granted for laptops if engaging in computational exercises or taking notes.

Collaboration: Collaboratively reviewing course materials and studying for exams with fellow students can be enriching. This is recommended. However, unless otherwise instructed, homework assignments are to be completed independently and materials submitted as homework should be the result of one's own independent work.

Late Work: Late work has a halflife of 1 hour. That is, adjusted for lateness, your grade $G(t)$ is a decaying percentage of the raw grade G_0. An assignment turned in t hours late will recieve a grade according to the following relation:

$$G(t) = G_0 e^{-\lambda t}$$

where

$$G(t) = \text{grade adjusted for lateness}$$
$$G_0 = \text{raw grade}$$
$$\lambda = \frac{ln(2)}{t_{\frac{1}{2}}} = \text{decay constant}$$
$$t = \text{time elapsed since due [hours]}$$
$$t_{1/2} = 1 = \text{half-life [hours]}$$

Make-up Work: There will be no negotiation about late work except in the case of absence documented by an absence letter from the Dean of Students. The university policy for requesting such a letter is in the Student Code. Please note that such a letter is appropriate for many types of conflicts, but that religious conflicts require special early handling. In accordance with university policy, students seeking an excused absence for religious reasons should complete the Request for Accommodation for Religious Observances Form, which can be found on the Office of the Dean of Students website. The student should submit this form to the instructor and the Office of the Dean of Students by the end of the second week of the course to which it applies.

Accessibility: I hope that this course will be inclusive and accommodating for all learners. As such, I am committed upholding the vision and values of Inclusive Illinois in my classroom. With regard to accommodating all learners, please note that many resources are provided through the Division of Disability Resources and Educational Services. To request particular accommodations, please contact me as soon as possible so that we can work out any necessary arrangements.

Other Resources: University students typically experience a wide range of stressors during their time on campus. Accordingly, campus resources exist to help students manage their stress levels as well as their general mental health while navigating this environment. I hope you will take advantage of these campus resources as soon as they can be of help.

- McKinley Mental Health Clinic

- Counselling Center

Date	Week	Day	Unit	Chap.	Quiz	HW Given	HW Due
08-22	1	M	Intro	1			
08-24	1	W	Overview	1			
08-26	1	F	Overview	1		HW1	
08-29	2	M	Econ	8	Q1		
08-31	2	W	Econ	8			
09-02	2	F	Econ	8		HW2	HW1
09-05	3	M	**No Class**	-	Q2		
09-07	3	W	Econ	8			
09-09	3	F	Econ	8		HW3	HW2
09-12	4	M	Mining&Milling	2	Q3		
09-14	4	W	Mining&Milling	2			
09-16	4	F	Conversion	3		HW4	HW3
09-19	5	M	Enrichment	3	Q4		
09-21	5	W	Enrichment	3			
09-23	5	F	Enrichment	3		HW5	HW4
09-26	6	M	Fuel Fab	4	Q5		
09-28	6	W	Fuel Fab	4			
09-30	6	F	Fuel Fab	4		HW6	HW5
10-03	7	M	Midterm		Q6		
10-05	7	W	Reactors	5			
10-07	7	F	Reactors	5		HW7	HW6
10-10	8	M	Reactors	5	Q7		
10-12	8	W	Fuel In-Core	6			
10-14	8	F	Fuel In-Core	6		HW8	HW7
10-17	9	M	Fuel In-Core	6	Q8		
10-19	9	W	Reprocessing	7			
10-21	9	F	Reprocessing	7		HW9	HW8
10-24	10	M	Reprocessing	7	Q9		
10-26	10	W	Reprocessing	7			
10-28	10	F	HLW	9		HW10	HW9
10-31	11	M	HLW	9	Q10		
11-02	11	W	HLW	9			
11-04	11	F	HLW	9		HW11	HW10
11-07	12	M	Midterm		Q11		
11-09	12	W	HLW	9			
11-11	12	F	HLW	9		HW12	HW11
11-14	13	M	LLW	10	Q12		
11-16	13	W	LLW	10			
11-18	13	F	Nonproliferation	11		HW13	HW12
11-21	14	M	**No Class**				
11-23	14	W	**No Class**				
11-25	14	F	**No Class**				
11-28	15	M	Environment	12	Q13		
11-30	15	W	Environment	12			
12-02	15	F	Environment	12			HW13
12-05	16	M	Environment	12			
12-07	16	W	Review				
12-09	16	F	**No Class**				
12-12	17	M	**No Class**				
12-14	17	W	**Final Exam**				

Work	Weight
¡+**item**+¿	(¡+percent+¿%)
¡+**item**+¿	(¡+percent+¿%)
¡+**item**+¿	(¡+percent+¿%)
¡+**item**+¿	(¡+percent+¿%)
Total	(¡+percent+¿%)