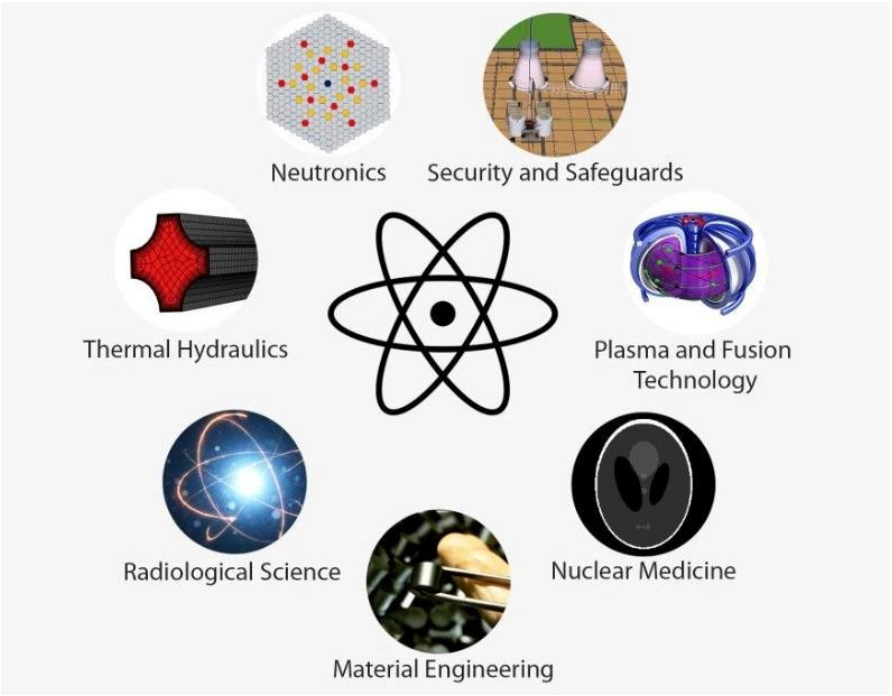

Syllabus
M.Sc. in Nuclear Engineering
Session 2022-2023 and onwards

Department of Nuclear Engineering
University of Dhaka
Dhaka-1000, Bangladesh

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Department of Nuclear Engineering (NE)
University of Dhaka

About the Department:

In accordance with Dhaka University Ordinances and Regulations 1973 and recommendations of the Faculty of Engineering and Technology meeting on 25-07-2010 & 19-08-2010, the Dean's Committee meeting on 24-08-2010 and recommendations of the Academic Council meeting on 25-08-2010, the Syndicate of Dhaka University has established the Department of Nuclear Engineering in its meeting on 29-08-2010. The Department of Nuclear Engineering is one of the newest Departments of the University of Dhaka, which began its journey in January 2012. This Department is the first of its kind and is the pioneer in nuclear engineering education in Bangladesh.

The missions of the Nuclear Engineering Department are:

- To develop high-quality nuclear engineers and scientists from undergraduate through the doctorate level who are capable of contributing valuable engineering skills and knowledge toward the design, building, and running of Bangladesh's nuclear power plants.
- To be Bangladesh's center of excellence in nuclear engineering education and research, to lead Bangladesh's effort to develop its nuclear infrastructure, and to introduce nuclear power as a part of its energy mix.
- To perform services for industry, government, professional organizations, and the public in areas related to nuclear and radiological engineering.

The vision of the Nuclear Engineering Department of the University of Dhaka is to be recognized as an excellent higher-education nuclear engineering institution in the global arena for effective and peaceful applications of nuclear energy.

Degrees Offered:

B.Sc. : 4 years (Eight semesters) undergraduate program

M.Sc. : 1.5 years (Three semesters) postgraduate program

Ph.D. : 4 years in any related field

Research Areas:

The faculties and students in undergraduate and graduate studies conduct research activities in various nuclear engineering fields. The major research area covers Neutronics, Thermal-Hydraulics, Computational Fluid Dynamics, Fuel Cycle and Waste Management, Radiation Damage to Materials, Plasma Physics and Fusion Technology, Nuclear Security and Safeguards, Radiological Science and Engineering, Nuclear Medicine.

Laboratories:

The department is enriched with well-equipped laboratories that cover practical aspects of physics, electrical and electronic engineering, heat transfer & fluid mechanics, thermal-hydraulics & reactor safety, radiation science & health physics, nuclear instrumentation & measurements, and computer programming & simulation.

Career Opportunities:

Graduated students will get a chance to work at Bangladesh Atomic Energy Commission (BAEC), Nuclear Power Plant Company Bangladesh Limited (NPCBL), and Bangladesh Atomic Energy Regulatory Authority (BAERA). In addition, graduates have opportunities to work at departments of nuclear engineering, physics departments, and related R&D organizations at home and abroad.

The Framework of The Semester System:

Program: M.Sc. in Nuclear Engineering

1. **Admission:** Students will be admitted to the program having B.Sc. in Nuclear Engineering degree from the University of Dhaka.

2. **Duration of the Program:** 1.5 years.

3. **Total Semesters:** 1.5 × 2 = 3 (2 Semesters per year).

4. **Breakdown of each semester (**Duration of Six academic calendar months**):**

   A. Class: Fifteen (15) active weeks

B. Preparatory Leave (PL): Maximum Two (2) weeks. No separate break for in-course examinations.
C. Semester Final Examinations: Two (2) weeks
D. Evaluation of Scripts and Publication of Results: Within two months from the last date of the theory exam is desirable.
E. Vacation: No break between semesters; Only the usual university's vacations apply.

5. **Total Number of Credits in 3 semesters (1.5 years): 36**

Total credits to be completed for obtaining the degree of M.Sc. in Nuclear Engineering is 36.

Classes/Contact Hours for the Courses:

A. For each credit of a theory course, there will be 1 class per week of 1 hour duration.
B. Total number of classes in a semester for each credit of a theory course will be 15 (15 × 1).
C. Total Contact Hours in a semester for each 1.0 credit theory course: 15 × 1 = 15.

The duration of theoretical course final Exams will be as follows:

Credit	Duration of Exam
3 credits Course	3 hours

Evaluation of the Courses/Thesis: As per university and respective faculty guidelines.

Grading System:

The current University Grants Commission (UGC) approved grading system applies as per university rules.

Marks	Letter Grade	Grade Point
80% and Above	A+	4.00
75% to < 80%	A	3.75
70% to < 75%	A-	3.50
65% to < 70%	B+	3.25
60% to < 65%	B	3.00
55% to < 60%	B-	2.75
50% to < 55%	C+	2.50
45% to < 50%	C	2.25
40% to < 45%	D	2.00
Less Than 40%	F	0.00
	I	Incomplete
	W	Withdrawn

Marks Distribution:

For a Theory Course

Attendance	05%
Assignment/Presentation	05%
Mid-term Examination (Incourse)	20%
Final Examination	70%
Total	100%

If more than one Mid-term Examination (Incourse) is taken, the final mark will be calculated by averaging all of them (the best one will not be allowed). Assignment/Presentation and Mid-term Examinations (Incourse) will be evaluated by the respective course teacher(s).

Guideline for Attendance Mark:

Attendance (%)	Marks (5)	Marks (10)
90 and Above	5	10
85 to 89	4	8
80 to 84	3	6
75 to 79	2	4
60 to 74	1	2

Less Than 60	0	0

Marks Distribution For Thesis

Defense	60%
Report	40%
Total	100%

Course Coordinator:

Each academic year will have a course coordinator. The coordinator will prepare class routines, monitor classes, arrange extra classes, if necessary, ensure smooth functioning of the academic activities, and help the Chairman (of the examination committee) hold examinations and publish results.

Class Representative:

Each batch/section of students will have two class representatives (one male and one female) to maintain liaison with the Course Coordinator regarding their class progress and problems.

Examination Committee:

A. The Academic Committee of the department will propose the examination committee consisting of 4 teachers.
B. There will be an examination committee for every academic year.
C. The committee will consist of a Chairman, two internal members, and an external member. The Course Coordinator should be one of the members of the committee.
D. The committee may have the external member from DU or outside DU.
E. The Chairman of the examination committee, with the help of the committee members, will be responsible for getting questions from the respective course teachers, moderating the questions and printing them, holding examinations, and publishing results.

Tabulators:

A. The examination committee will appoint two tabulators.

B. Course teachers/examiners will submit their grade sheets in detail.
C. The tabulators will enter the marks given by each course teacher/examiner in the tabulation sheets independently and process the examination results.
D. The controller's office will publish the examination results at the end of every semester and issue the transcripts.

Requirements for the Award of the M.Sc. in Nuclear Engineering Degree:

A. The minimum Grade Point (GP) of 2.00 in each theory course and an overall Cumulative Grade Point Average (CGPA) of 2.5 will be required for the award of the M.Sc. in Nuclear Engineering Degree without "F" grade in any course.
B. $CGPA = \frac{\sum G_i \cdot C_i}{\sum C_i}$, where, G_i is the grade point obtained in course i and C_i is the corresponding credit.
C. The Degree must be earned within the limit of 3 consecutive semesters, i.e., 1.5 academic years from the date of admission to the 1st semester.
D. There will be no option for grace.

Requirement to Sit for Course Final Exam

Students having 75% or more attendance on average are eligible to sit for the semester final examinations. Students having attendance 60-74% will be considered to sit for the examination as per the University rules. Students having attendance below 60% will not be eligible to appear at the examination but may seek readmission to the program according to university rules..

Improvement Examination:

A. To clear the "F" grade/grades of any course/courses, a student will get the single earliest available chance complying with the time required for the degree. The best grade that the student can be awarded is "B+" (B plus). A student will not be allowed for grade improvement if he or she passes the final semester and the final semester result is published.
B. A student may sit for the improvement examination for any course/courses complying with the time required for the degree where

the grade obtained is less than or equal to "C+" (C plus) and the best grade that a student can be awarded is "B+" (B plus). However, if the grade is not improved, the previous grade will remain valid.

C. In addition to the usual fees, an additional fine is applicable according to the decision of the Academic Committee.

Re-admission and Drop Out:

A. A student may be allowed for re-admission for a maximum of two times within two consecutive academic years to complete the M.Sc. in Nuclear Engineering program.
B. A student may seek re-admission provided he or she has at least 30% attendance in the previous semester.
C. A student failing to get the minimum required CGPA even after taking re-admission will be dropped out of the program.
D. In case of rejection of an "F" grade in the thesis, a student can retain his or her marks for the theory courses for one (1) semester.

Other General Regulations

A. For any matter not covered in the above guidelines, existing rules of University of Dhaka will be applicable.
B. Disciplinary and punishable actions will be applied according to the existing rules of the University of Dhaka.

Course Identification:

Every course has a unique course code. The letter prefix in any course code indicates the field or the discipline of the course, i.e.,

NE Nuclear Engineering

The digits in the course code have the following meaning:

1st Digit – Represent year of the offered course, 2nd Digit – Represent semester of the offered course 3rd and 4th Digit – Represent offered course number (odd for a theoretical course and even for a laboratory or sessional course)

Semester-Wise Course and Credit Distribution of Different Years:

<table>
<tr><th colspan="2">Courses (Credits)</th></tr>
<tr><td>First Semester:
Theory Courses (Compulsory): 1 (3×1 Credits)
Theory Courses (Optional): 3 (3×3 Credits)
Total: 12.0 Credits</td><td>Second Semester:
Theory Courses (Compulsory): 1 (3×1 Credits)
Theory Courses (Optional): 3 (3×3 Credits)
Viva-Voce (2 Credits)
Total: 14.0 Credits</td></tr>
<tr><td colspan="2">Third Semester:
Thesis (10 Credits)
Total: 10.0 Credits</td></tr>
<tr><td colspan="2">Grand Total: 36 Credits</td></tr>
</table>

Syllabus for M.Sc. in Nuclear Engineering

List of Courses in Different Semesters

First Semester

Course Code	Course Title	Credit Hour
NE 5101	Nuclear Core Design and Analysis	3.0
NE 5103	NEOP	3.0
NE 5105	NEOP	3.0
NE 5107	NEOP	3.0
	Total	**12.0**

Second Semester

Course Code	Course Title	Credit Hour
NE 5201	Advanced Thermal Hydraulics of Nuclear Reactors	3.0
NE 5203	NEOP	3.0
NE 5205	NEOP	3.0
NE 5207	NEOP	3.0
NE 5200	Viva-Voce	2.0
	Total	**14.0**

Third Semester

Course Code	Course Title	Credit Hour
NE 5300	Thesis	10.0
	Total	**10.0**

Nuclear Engineering Optional Courses (NEOPs)

Course Code	Course Title	Credit Hour
NEOP	Computational Material Science	3.0
NEOP	Computational Plasma Physics	3.0
NEOP	Introduction to Machine Learning	3.0
NEOP	Methods of Scientific Computing	3.0
NEOP	Multiphase Flow CFD Analysis	3.0
NEOP	Nuclear Medicine and Radiation Therapy	3.0
NEOP	Nuclear Nonproliferation Technology and Policy	3.0
NEOP	Nuclear Policy, Law, and Regulations	3.0
NEOP	Numerical Analysis of Reactor Accidents	3.0
NEOP	Plasma-Material Interactions	3.0
NEOP	Project Management: Strategies and Principles	3.0
NEOP	Radiation Effects on Materials	3.0
NEOP	Radiation Transport Methods	3.0
NEOP	Radiological and Environmental Impact of Nuclear Facility	3.0
NEOP	Reactor Dynamics and Stability	3.0
NEOP	Reactor Instrumentation and Control System	3.0