

1.3.2 Number of value-added courses for imparting transferable and life skills offered during last five

1.3.3 Average Percentage of students enrolled in the courses under 1.3.2 above (10)

Year -1						
Name of the value added courses (with 30 or more contact hours) offered	Course Code (if any)	Year of offering	No. of times offered during the same year	Duration of course	Number of students enrolled in the year	Number of Students completing the course in the year
Theory of Pressure Vessel Design	MG-01	2014	1	35 hrs	49	17
Year 2						
Name of the value added courses (with 30 or more contact hours) offered	Course Code (if any)	Year of offering	No. of times offered during the same year	Duration of course	Number of students enrolled in the year	Number of Students completing the course in the year
Essence of Materials Science	MG-02	2015	1	60 hrs	66	22
Year 3						
Name of the value added courses (with 30 or more contact hours) offered	Course Code (if any)	Year of offering	No. of times offered during the same year	Duration of course	Number of students enrolled in the year	Number of Students completing the course in the year
Year 4						
Name of the value added courses (with 30 or more contact hours) offered	Course Code (if any)	Year of offering	No. of times offered during the same year	Duration of course	Number of students enrolled in the year	Number of Students completing the course in the year

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Singh 13.08.2020

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Linear Control Systems Theory	EG-13	2017	1	48 hrs	16	6
Natural Circulation Based Passive Safety Systems for	MG-03	2017	1	48 hrs	12	6
Nuclear Fuels and Fuel Cycle	MG-04	2017	1	48 hrs	65	36
<b>Year 5</b>						
Name of the value added courses (with 30 or more contact hours) offered	Course Code (if any)	Year of offering	No. of times offered during the same year	Duration of course	Number of students enrolled in the year	Number of Students completing the course in the year
State - space approach to reactor control	EG-01	2018	1	48 hrs	13	6
Natural Circulation based passive safety system for advanced reactor	M-G03	2018	1	48 hrs	9	5
Advanced computational physics	PY705	2018	1	35 hrs	20	20

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## QUEST- Continuing Education Programme of HBNI: **Details** of 10<sup>th</sup> Set of Course

**HRD Division invites applications from employees of DAE units located in Mumbai/ Navi Mumbai, and from HBNI students for the following new Advanced Course-**

**Course Title: Nuclear Fuels & Fuel Cycle Engineering**

**Code: MG-04**

**The** course will comprise about 32 lectures of 1.5 hours (1 hour and 30 minutes) duration. There will be about 5 lectures per week for the course. The exact timetable and schedule of course to be offered will be notified later based on the nomination response received for the same.

- These advanced courses are offered to the DAE employees subject to approval from competent authority (Head of Division or equivalent within BARC & other DAE units in Mumbai/ Navi Mumbai). Students pursuing M.Tech/ M.Sc. (Engg)/ Ph.D. programmes of HBNI may forward the applications through their respective guides.
- It is mandatory that the interested employees/ HBNI students enrolled for the Course have a minimum of 80% attendance in the classes to be eligible to appear in the final written examination. Kindly note that certificates will be issued only to those who appear in the written examination and score an aggregate of 50% or more in home/classroom assignments & written examinations taken together.

Interested eligible employees and HBNI students meeting the specified eligibility criteria, wherever applicable, may forward their applications/ nominations through their Division Head or equivalent competent authority as the case may be, to

**Shri S.K. Singh,  
HRDD**

latest by **18<sup>th</sup> May, 2017** to ensure programme implementation as envisaged above.

**Detailed course content and Application Form** is available on **BTS>HRD>CEP>QUEST**  
**Kindly note that a course will be offered subject to the receipt of a minimum number of applications in the same and decision of the coordinator/ Faculty concerned will be final in this regard.**

Summary of the Proposed Course on  
**Nuclear Fuels & Fuel Cycle Engineering:**

Course Code	Course Title	Eligibility	HBNI faculty/ Associate faculty
<b>MG-04</b>	Nuclear Fuels & Fuel Cycle Engineering	(1) Engineering graduates <b>OR</b> (2) Science Postgraduates	HBNI Recognized <b>Faculty:</b> Dr. C. Ganguli, DS(Retd.) Ex-Chairman & CE, NFC Presently Distinguished Professor of Nuclear Engineering at PDPU, Gandhinagar

**Summary of the Course:** The course will cover all aspects of uranium, plutonium and thorium fuels and related fuel cycles for nuclear power reactors (Generation II, III & IV) and Aluminum Matrix Dispersion Fuels for Research Reactors:

- i) **Oxide and Mixed Oxides Fuels** for Generation II & Generation III LWRs & PHWRs-their fabrication, out-of-pile thermophysical properties and in-pile behaviour.
- ii) **Mixed uranium** plutonium oxide, monocarbide, mononitride and U-Pu-Zr metallic fuels, with and without minor actinides, for sodium cooled fastbreeder reactors and other Gen IV fast reactors their fabrication, out-of-pile thermophysical properties and in-pile behaviour.
- iii) **Accident Tolerant Fuels** for nuclear power reactors.
- iv) **Fuels & Fuel Cycle** for Gen IV Molten Salt Breeder Reactor and High Temperature Gas Cooled Reactors.
- v) **Low Enriched Uranium based Dispersion** Type fuels for non-power research reactors: Al-UAlx, Al-U3O8, Al-U3Si2 & Al-U/Mo & Monolithic U-Mo Fuel.
- vi) **Front and Back ends** of Uranium Fuel Cycle and Thorium Fuel Cycle with focus on Mining, Milling, and Refining & Conversion in Front End and Spent Fuel Storage and Reprocessing (PUREX, THOREX & advanced partitioning techniques based on aqueous and pyro processes).
- vii) **Fuel pin modeling:** governing equations, burnup dependent thermophysical properties, relocation, pellet swelling, gap conductance, fission gas release, gas pressure, PCI & PCMI, integrity of fuel clad due to strain and presence of iodine.
- viii) **Fuel behavior during** station blackout conditions, beyond design basis accidents and pressurized thermal shock (PTS) events.
- ix) **Fuel cycle economics** and fuel cost calculation.
- x) **In-core and out-of-core** nuclear fuel management.