Education in the Nuclear Field

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Department of Nuclear Engineering

Program of Postgraduate in Nuclear Sciences and Techniques

Structure in the Nuclear Field Education in Brazil

- Undergraduate Studies
- Undergraduate Insertion
- Postgraduate Studies - Master and Doctor Courses
- Employment Market
- PCTN – Program of Postgraduate in Nuclear Sciences and Techniques

Undergraduate Studies

- Undergraduate in Nuclear Engineering
Federal University of Rio de Janeiro - UFRJ (2010)
duration of 5 years - 30 admissions/year

- Energy Engineering Undergraduates: Nuclear (some subjects)
UFPE
UFABC
PUC-MG

Undergraduate Studies
Subjects offered in undergraduate courses at UFMG

Code	Credit	Subject	Undergraduate Courses
ENU001	4	Radioisotopes Applications	Civil, Mining, Chemical, Environmental and Metallurgical Engineerings, Physical
ENU601	4	Introduction to Nuclear Energy I	Mining, Chemical and Metallurgical Engineerings, Physical
ENU005	4	Methodology and Models on Energy Planning	Electrical Engineering
ENU006	3	Fundamentals of Nuclear Energy	Electrical Engineering
ENU003	4	Radiation Protection	Mining, Chemical and Metallurgical Engineerings, Physics
ENU007	4	Radiation Detection and Nuclear Instrumentation	Mining, Chemical and Metallurgical Engineerings, Physics
ENU008	4	Exergetic Analysis of Processes	Mining, Chemical and Metallurgical Engineerings
ENU003	4	Energy Questions	Civil and Chemical Engineerings

Undergraduate Studies

New options to undergraduate courses at UFMG

- Undergraduate Physics with Emphasis on Nuclear Energy
- Undergraduate Physics with Emphasis on Medical Physics
- Mining Engineering - Additional Education in Fundamentals of Nuclear Engineering

Postgraduate Studies - Master and Doctor Courses

University/ Institute	Name https://sucupira.capes.gov.br	Initial Year		CAPES Evaluation (2013-2016)	Number of Professors 2017
		M	D		
UFRJ	ENGENHARIA NUCLEAR	1968	1979	6	15
UFPE**	TECNOLOGIAS ENERGÉTICAS NUCLEARES	1977	1997	5	15
UFMG	**CIÊNCIAS TÉCNICAS NUCLEARES**	**1968**	**2006**	**5**	**12**
IME	ENGENHARIA NUCLEAR	1969	-	3	6
USP***	TECNOLOGIA NUCLEAR	1976	1976	6	87
CDTN*	CIÊNCIA E TECNOLOGIA DAS RADIAÇÕES, MINERAIS E MATERIAIS	2002	2010	4	27
IEN*	CIÊNCIA E TECNOLOGIA NUCLEARES	2004	-	3	14
IRD*	RADIOPROTEÇÃO E DOSIMETRIA	2001	2012	4	22

*Units of the National Nuclear Energy Comission (CNEN)
** cooperation with the Regional Center of Nuclear Sciences of Northeast (CRCN-NE), unit of CNEN
*** cooperation with the Institute of Energy and Nuclear Research (IPEN), unit of CNEN

Postgraduate studies - Master and Doctor Courses
Areas of Concentration - Universities

University	Areas of Concentration
IME	- Nuclear Facilities
UFRJ	- Security Analysis
	- Engineering of Human Factors
	- Reactors Engineering
	- Physics of Reactors
	- Applied Nuclear Physics
UFPE/CRCN-NE	- Applications of Radioisotopes in Agriculture and the Environment
	- Applications of Radioisotopes in Industry and Medicine
	- Dosimetry and Nuclear Instrumentation
	- Reactors Engineering
	- Renewable Energy Sources
UFMG	- Radiation Sciences
	- Nuclear and Energy Engineering
USP/IPEN	- Nuclear Technology – Applications
	- Nuclear Technology – Materials
	- Nuclear Technology - Reactors

Postgraduate studies - Master and Doctor Courses Areas of Concentration - Research Institutes

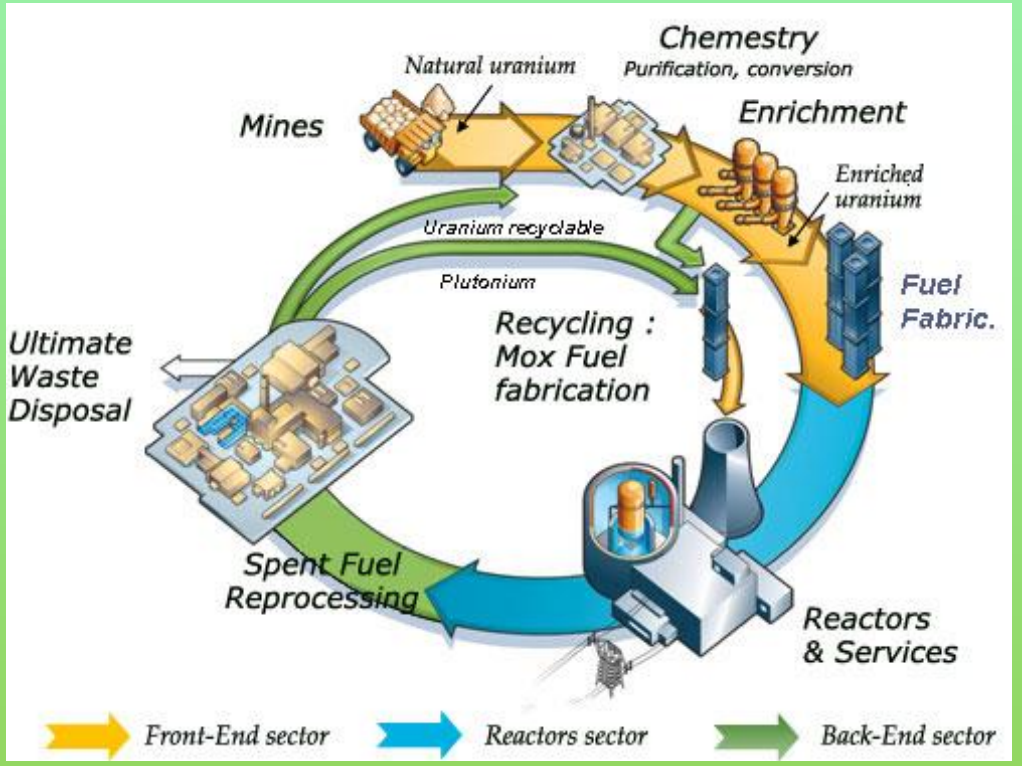
Institute	Areas of Concentration
CDTN	Science and Technology of the materials
	Science and Technology of Minerals and Environment
	Science and Technology of Radiations
	Science and Technology of Nuclear Reactors
IEN	Technology and Safety of Reactors
	Environmental Impact of Nuclear Facilities
	Computational Methods Applied to Nuclear Engineering
	Applications of Nuclear Techniques
IRD	Biophysics of Radiation
	Medical Physics
	Metrology
	Radioecology

Employment Market
Industries

INB
INDÚSTRIAS NUCLEARES DO BRASIL

Eletrobras
Eletronuclear

AMAZUL
Amazônia Azul
Tecnologias de Defesa S.A.



Employment Market
Research Institutes and Universities

Comissão Nacional de Energia Nuclear
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E INOVAÇÃO

ipen · CDTN · ien · CRCN-NE Centro Regional de Ciências Nucleares do Nordeste · IRD

USP · UFRJ 100 Anos 1920 | 2020 · UFMG · UFPE · IME

Employment Market

Application Areas:

- Industrial Applications;
- Medical Applications;
- Nuclear Fuel Cycle;
- Nuclear Reactors;
- Transport and wastes.

Employment Market

- Radiation Protection Supervisor
- Audits of Radiation Protection Service

Employment Market
Radiation Protection Supervisor

- Are requirements for application:
  - To have undergraduate, graduate or technologist recognized by the MEC in the areas of exact sciences and earth, biological sciences, engineering, health sciences, agricultural sciences or radiological sciences;
  - Have training compatible with the intended area of action.

Employment Market
Radiation Protection Supervisor

Areas of Certification:

The Radiation Protection Supervisor must be certified for each area of work. The National Nuclear Energy Commission (CNEN) classifies the areas of activity into three groups:

* Radiactive Facilities
* Nuclear Facilities
* Other areas.

PCTN - Program of Postgraduate in Nuclear Sciences and Techniques

Course Coordinator: Prof. Claubia Pereira

UFMG - School of Engineering

Department of Nuclear Engineering

Activities on

- Radiation Sciences
- Nuclear and Energy Engineering

PCTN - Program of Postgraduate in Nuclear Sciences and Techniques

Radiation Sciences

Use and development of nuclear techniques and methods for:

- **Applications of Radiation to the Environment**

industrial applications, environmental control and radioecology.

- **Applications of Radiation to Biomedical**

applications in medical physics, radiodiagnosis, radiotherapy, nuclear medicine, radiochemistry and radiobiology.

- **Dosimetry, Radiation Protection and Nuclear Instrumentation**

determination of dose rates due to radiation applications; development of instrumentation and techniques related to the detection and measurement of radiation and to to better management of radioactive waste.

PCTN - Program of Postgraduate in Nuclear Sciences and Techniques

Nuclear and Energy Engineering

- Nuclear Reactor Technology and Fuel Cycles

Support for other lines that need theoretical training in neutron physics and particle transport;

Development of methods and techniques for the use of nuclear codes in the area of reactors and nuclear systems (neutron, thermal hydraulics and safety of nuclear systems);

Studies related to the development of radioactive waste transmutation nuclear systems including also GEN-IV reactors and hybrid systems.

PCTN - Program of Postgraduate in Nuclear Sciences and Techniques

Nuclear and Energy Engineering

- Technological, Social-Economic and Environmental Assessment of Energy Systems
  - Evaluation and analysis of several energy systems in order to obtain optimization between production and utilization.
  - Energy planning.
  - Exergetic analysis.
  - Environmental impact.
  - Assessment of power plants costs.
  - Building efficiency and comfort.
  - Renewable energy.
  - Energy Cogeneration.
  - Hydrogen Production.

PCTN - Program of Postgraduate in Nuclear Sciences and Techniques

Education Grants

- CAPES – *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (Coordination of Training of Higher Level Personnel)
- CNEN – *Comissão Nacional de Energia Nuclear* (National Nuclear Energy Commission)
- CNPq – *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (National Council for Scientific and Technological Development
- FAPEMIG – Fundação de Amparo à Pesquisa de Minas Gerais (Foundation for Research Support of Minas Gerais)

Thanks to CNEN for this invitation

Thanks to FAPEMIG for supporting this participation.

THANKS FOR YOUR ATTENTION!