JÜLICH Forschungszentrum

One week training course on

Radiation Protection - Basics and Applications (RaPBA)

Forschungszentrum Jülich,
March 9th – 13th, 2020

A course hosted by Forschungszentrum Jülich

Supported by

EUROPEAN JOINT PROGRAMME FOR THE INTEGRATION OF RADIATION PROTECTION RESEARCH
CONCERT

Forschungszentrum Jülich GmbH
Department for Safety and Radiation Protection
52425 Jülich

Mitglied der Helmholtz-Gemeinschaft

About the Training Course

Dear Scholars,

the one week training course “Radiation Protection - Basics and Applications (RaPBA)” is organized and held by the Forschungszentrum Jülich and is financially supported by “CONCERT – The European Joint Programme for the Integration of Radiation Protection Research” under the EU framework HORIZON 2020.

The content of teaching covers the basics in radiation protection and will give insights in today´s standards of applied radiation protection. It includes lectures and practical training with particular emphasis on radionuclide monitoring and dispersion in the environment, individual monitoring and dose assessment after internal exposure, short-range particle emitter and cellular dosimetry, as well as emergency preparedness and response.

The course is open for students at the MSc and PhD level in the scientific fields of physics, chemistry, nuclear applications, life sciences, environmental toxicology and related degree programmes and will be held in English.

As a member of the Helmholtz Research Society, the Forschungszentrum Jülich is one of the largest research facilities in Europe and has a long standing expertise in radiation protection, both, in research and practical applications. Reactor development was for many years the main research field at the Forschungszentrum Jülich and, in parallel, the field of Radiation Protection was developed and implemented ensuring the highest standards in radiation safety.

We present you a very interesting and multi-faceted programme and we are looking forward to welcoming you soon in Jülich.

Burkhard Heuel-Fabianek
Forschungszentrum Jülich

Ralf Kriehuber
Forschungszentrum Jülich

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Application

Please submit the following documents via Email before **15th November 2019**

- Letter of application
- CV with description of the academic education
- Supporting letter from the supervisor (only for PhD students)

To:
Sabine Schmitz
Forschungszentrum Jülich
Tel.: ++49 (0)2461 613638
Email: sa.schmitz@fz-juelich.de

Confirmation of acceptance will be sent latest by 2nd of December 2019.

Please note that there is **a maximum of 12 participants**.

Organization of the course

- Course runs from 09.03. – 13.03.2020
- No course fees
- Participants will get free accommodation, breakfast and lunch
- A certificate of attendance will be issued at the end of the course

Venue

Forschungszentrum Jülich
Wilhelm-Johnen-Str.
52425 Jülich, Germany

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Specified course contents of the lectures and practical training

Lectures

”Dose definitions and concepts” – Dr. E. Pomplun
- energy absorption in matter, LET, Bragg peak
- absorbed dose, equivalent dose, effective dose, weighting factors

”Basics in environmental monitoring” – Dr. E. Kümmerle
- monitoring of air, water, soil, vegetation, food
- sampling techniques, measuring methods

”Atmospheric dispersion and dose assessment” – Dr. E. Kümmerle
- calculation of atmospheric dispersion of radioactive emissions
- dose calculation for reference persons of the population

”Radionuclides in the soil” – Dr. T. Pütz
- fate of radionuclides in air, water, soil, vegetation, food
- leaching, adsorption, desorption

”Methods and radionuclides in environmental research” – Dr. D. Hofmann
- C-14: balance, metabolism
- P-33: analytics, bio-imaging

”Essentials of incorporation monitoring” – Dr. M. Zoriy / M. Froning
- radiochemical measurement methods
- direct measurement
- internal dose assessment
- quality assurance and quality control

”Microdosimetry for short-range particle emitter” – Dr. E. Pomplun
- Introduction into Microdosimetry
- Energy deposition on the cellular and molecular level
- Monte Carlo simulations of track structures and modelling of DNA damage patterns

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Specified course contents of the lectures and practical training

Lectures

”Biological effectiveness of Auger electron emitters” – Dr. R. Kriehuber
- Auger effect, RBE and cellular localization
- Cytotoxicity and Genotoxicity of Auger electron emitters
- Auger electron emitter induced alterations of gene expression

“New approaches in biological dosimetry” – Dr. R. Kriehuber
- Standard methods and techniques
- Gene expression based methods

”Emergency response on national and facility level” – Dr. P. Hill
- Legal basis with focus on the situation in Germany
- Basics of contamination measurement, dose-rate measurement, dust sampling

”Incorporation monitoring in emergency response” – Dr. P. Hill
- Basics (triage, acute incorporations, existing exposure situations)
- Triage (mass screening, instrumentation)
- Assessment of acute incorporations (e.g. Chernobyl, Fukushima)
- Existing exposure situations (e.g. Chernobyl, SNTS, chronic intake)

Tutorship

“Basics: Ionizing radiation and radiation protection” – all lecturers

Practical training / Laboratory

”Practical radioactivity measurements and equipment” – Dr. E. Kümmerle
- Automated measuring station for gamma dose rate and particulate matter in the air
- Gamma spectrometry & mobile measurements

”Modelling radionuclides in soil and plants” – Dr. T. Pütz
- Transfer model
- Model parameterization

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Specified course contents of the lectures and practical training

Practical training / Laboratory

”Radionuclides in soil and plants” – Dr. D. Hofmann
- Lysimeter station, columns, laboratory equipment, rhizotron,

”Incorporation measurement 1 – radiochemistry” – Dr. M- Zoriy
- Radiochemical preparation
- Spectrometric determination of e.g. Am-241
- α-/ß- spectrometry e.g. Am-241 and H-3

”Incorporation measurement 2 - whole body counting” – G. Lünendonk/M. Froning
- Whole body measurement
- Calibration and phantoms

”Incorporation measurement 3 - internal dose assessments” – M. Froning
- Handling and interpretation of monitoring data
- Dose estimate of routine monitoring data (e.g. U_{nat} or H-3)

”Cellular radiobiology I - IV” – Dr. R. Kriehuber / Dr. S. Schmitz / Dr. M. Unverricht-Yeboah / D. Oskamp
- Cell culture and exposure to radionuclides
- Micronucleus and gamma-H2AX-foci assay, Apoptosis detection, Cell survival

”Practical exercises in emergency response” – Dr. P. Hill
- Measuring contamination, measuring techniques
- Taking samples; sample evaluation, measurements and evaluation of results
- Assessment of thyroid burdens in emergency situations

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