The CSN provides users of this website with an unofficial translation of the law in question. You are therefore advised that this translation is for your information only and may not be entirely up to date when you consult it. For official texts, look up the law in the Boletín Oficial del Estado, where you can find laws in any of the official languages of the State of Spain.

CSN

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Nuclear Safety Council (BOE no. 43, of 19/02/2008)

The Nuclear Safety Council's INSTRUCTION IS-17, of 30th January, on the recognition of training courses and programmes for personnel that manage the operation of or operate equipment in X-ray facilities for medical diagnosis and the accreditation of the personnel of said facilities.

TEXT

The Nuclear Safety Council, in exercise of the functions conferred to it by Article 2, Section 1) of Law 15/1980, of 22nd April, creating the Nuclear Safety Council, in the phrasing of it given by Law 33/2007, and in accordance with that established in Articles 57 to 68 of Royal Decree 2869/1972, approving the Regulation governing nuclear and radioactive facilities, and its subsequent modification, in Article 55.3 of said Regulation, by Royal Decree 1836/1999, of 3rd December, has been granting credentials to manage and operate X-ray facilities for medical diagnosis.

Article 14 of Royal Decree 1891/1991, of 30th December, (replaced by Royal Decree 1085/2009 of 3rd of July, Article 23) on the installation and use of X-ray devices for medical diagnosis, establishes that graduates who manage the operation of the facilities and the operators who act under their supervision must submit to the CSN documents proving their knowledge, training and experience as regards radiological protection.

Likewise, it determines that those people who pass the courses or programmes established to this end by the CSN - who may officially approve the specific academic programmes or training courses - are accredited to manage or operate X-ray equipment.

Said accreditation may be justified either by passing courses or programmes object of the recognition or by a direct path, by documentarily proving they have the proper knowledge and experience to obtain the credentials.

On the basis of that established in said Article 14(of Royal Decree 1891/1991, replaced by Royal Decree 1085/2009), the CSN gave a Ruling, of 5th November 1992, setting the rules which the recognition of courses or programmes entitling to manage and operate X-ray facilities for medical diagnosis shall have to abide by.

With regard to the training of personnel, Article 33 of the Treaty establishing the European Atomic Energy Community stipulates that each member state must adopt the necessary measures in reference to teaching, education and professional training.

The specific provisions of the Health Sector, such as Royal Decree 1132/1990, of 14th September, establishing basic measures for the radiological protection of people subjected to medical examinations and treatments, Royal Decree 1976/1999, of 23rd December, establishing the criteria for quality in radiodiagnosis, and Royal Decree 815/2001, of 13th June, on the justification for the use of ionising radiations for the radiological protection of people on the occasion of medical exposures, have been taken into account in the present Instruction.

Everything that has previously been set out, and given the technological and scientific evolution that has taken place in diagnostic procedures and the specialisation required by the training of personnel in radiological safety and protection aspects related to X-ray facilities for medical diagnosis, has made the need to review the content of the conditions for the recognition of training courses and programmes essential.

By virtue of the all the above and in accordance with the legal authorisation envisaged in Section 1 of Article 2 of Law 33/2007 reforming Law 15/1980, of 22nd April, creating the Nuclear Safety Council, prior consultation of the affected sectors and after the appropriate technical reports, this Nuclear Safety Council, during its meeting on the 30th of January of 2008, has stipulated the following:

TITLE I

General provisions

First. Purpose.- The purpose of this Instruction is to set the criteria for recognition of training courses or programmes on radiological safety and protection that qualify the personnel that manage the operation of X-ray facilities for medical diagnosis purposes or operate the equipment found in them and for obtaining the corresponding credentials either by passing said courses or programmes or by a direct path.

Second. Scope of application.- The present Instruction, for the purposes established by Chapter 5 of Royal Decree 1891/1991, of 30th December(replaced by Royal Decree 1085/2009 of 3rd of July, Chapter 4), on the installation and use of X-ray devices for medical diagnosis, applies to:

The entities or institutions interested in obtaining the recognition of specific academic programmes and training courses entitling to manage the operation of X-ray facilities for medical diagnosis purposes or operate the equipment found in them.

The people interested in obtaining credentials to manage or operate X-ray facilities for medical diagnosis purposes either by taking recognized training courses or programs or by a direct path.

Third. Definitions.- The definitions of the terms and concepts used in the present Instruction match those contained in the following legal documents:

Law 25/1964, of 29th April, on Nuclear Energy (BOE no. 107, of 4th May 1964, second Article), modified by the Electricity Sector Law 54/1997, of 27th November (BOE no. 285, of 28th November 1997), modified by Law 33/2007.

Law 33/2007, of 7th November, modifying Law 15/1980, of 22nd April, creating the Nuclear Safety Council (BOE no. 268, of 8th November 2007).

Royal Decree 1891/1991, of 30th December(replaced by Royal Decree 1085/2009 of 3rd of July), on the installation and use of X-ray devices for medical diagnosis. (BOE no. 3, of 3rd January 1992.) (BOE nº 173 of 18th July 2009)

Royal Decree 545/1995, of 7th April, establishing the degree of Higher Diagnostic Imaging Engineer and the corresponding minimum courses. (BOE no. 139, of 12th June 1995.)

Royal Decree 1838/1999, of 3rd December, approving the Regulation governing nuclear and radioactive facilities. (BOE no. 313, of 31st December 1999.)

Royal Decree 1976/1999, of 23rd December, establishing the criteria for quality in radiodiagnosis. (BOE no. 311, of 29th December 1995.)

RD 783/2001, of 6th June, approving the Regulation on health protection against ionising radiations (BOE no. 178, of 26th July 2001).

TITLE II

Recognition of courses

Fourth. Modes of courses.- According to the activities to be carried out in the X-ray facilities for medical diagnosis purposes, two modes of courses are established:

General radiodiagnosis.

Dental or chiropodial radiodiagnosis.

The credentials obtained in the general radiodiagnosis courses will be valid for any application in medical radiodiagnosis of human beings and animals; the dental or chiropodial radiodiagnosis credentials will only be valid for X-ray facilities for medical diagnosis purposes dedicated to dental or chiropodial radiology.

Within each mode, the courses are organised in two levels, one for university graduates who are going to manage the operation of a facility and another one for the personnel who are going to operate said facilities under the direction of a duly accredited university graduate.

Fifth. Requirements.

Director: as the person responsible for them, the director of the courses must submit documents proving his/her education and professional experience in radiodiagnostic equipment and, preferably, teaching experience in radiological safety and protection.

Teaching staff: the teachers who are to give the courses object of recognition will be university graduates in the subjects object thereof, with at least two years of teaching or professional experience in radiodiagnostic equipment.

Professionals accredited to operate X-ray equipment for medical diagnosis purposes and who have two years of minimum experience may collaborate in the practice classes.

Students: the students who are to attend the management accreditation courses will be graduates in Medicine and Surgery, Odontology or Veterinary Science or registered chiropodists.

The students who are to attend the operation accreditation courses will have a secondary school diploma, a higher professional training degree or an equivalent degree.

Facilities: the radioactive facilities where the practicals included in the syllabus are to be given will have the equipment and devices needed to achieve the expected general and specific goals.

Said facilities must be declared and registered in the corresponding register and will have the mandatory permits in compliance with current regulations.

Sixth. Application for recognition.- The entities or institutions that are interested in obtaining the recognition of specific training programmes and courses entitling to manage the operation or operate X-ray equipment for medical diagnosis purposes shall submit the corresponding application at the General Registry of the Nuclear Safety Council, without prejudice to the provisions of Article 38 of Law 30/1992, of 26th November, on the Legal System of Public Administrations and Common Administrative Procedure.

Said application shall be accompanied by the documentation that appears in Attachment A “Protocol for the recognition of courses”, which shall include the documentary proof relating to the availability of qualified personnel and technical means.

Seventh. Recognition.- Once the documentation that is mentioned in the Section Sixth has been properly and fully submitted and favourably considered, the Nuclear Safety Council shall proceed to pass the express decision on the temporary recognition of the course for a period of three years.

The applicant entity or institution may obtain successive extensions thereof, provided it submits the corresponding application two months before the period of validity expires, and its conditions for

recognition may be modified when the circumstances of updating so require it.

The recognition shall be specific for every course mode and level, regardless of the number of courses thereof that are given.

Eighth. Giving recognized courses.- The organising entity or institution may give recognized course at different sites and as many times as desired during the period of validity of the recognition.

The following aspects will be taken into account for giving recognized courses:

Notifications: The CSN shall be notified of the date when of each course starts as well as of any variations that are foreseen with regard to the data included in the initial protocol, in particular the syllabus, at least twenty days in advance, the appropriate documents being attached in order to prove that the criteria set in this Instruction are maintained.

Once the course is notified, should any unforeseen event take place before or after it is given forcing to modify the data contained in the protocol or the syllabus, the CSN must be notified immediately, the reasons behind said modification being justified.

In the event the course is suspended, the CSN must be notified at least five days in advance of the date it was expected to be given.

Content of the syllabus: The content and depth of the subjects to be given - which are shown in Attachment B “Content of the training programmes” - must take into consideration the personnel’s basic training and its degree of responsibility in the running of the facility, in accordance with each of the levels. Likewise, whenever the group is going to dedicate its activity to a certain radiological technique, the programme must be adapted to the particular radiological protection conditions applicable in that field.

On the other hand, the content of the programmes must be updated in accordance with the regulations in force at any time.

Planning: The minimum hours set in Attachment C “Planning of courses” with regard to the hours of lessons devoted to both theory and practice sessions shall be taken into account in the scheduling of the courses.

At most, five hours of theory sessions will be scheduled daily. The organisation of seminars or debates on the subjects taught is recommended. At any rate, no more than seven hours in total, including practicals, seminars and symposiums, shall be given.

Theory sessions shall be given in the order set in the syllabuses included in Attachment B, and shall be supplemented with the solving of exercises on the subjects taught under the guidance of the teachers.

The number of students per course shall be the appropriate number for the conditions of the rooms where the courses are going to be given. The number of students per practicals group shall not be greater than six, shall be adapted to the content and type of the practicals and shall take into consideration the possibility that students operate instrumentation or equipment.

Each of the scheduled practicals must be given by one teacher, who may not attend to more than one group of students at the same time.

The Management of the course must have at all times the documentation proving the syllabus is being followed. The teachers shall give proof, by means of their signature, of the theory and practice sessions given.

Availability of means: The rooms and facilities shall be suitable for giving sessions and carrying out the practicals.

Before the start of the course, the text book of the theory lessons and the outlines of the practicals, corresponding to the level and mode thereof, shall be made available to the students.

The facility where the practicals are carried out must be fit so as to be capable of justifying at all times the compliance with the current regulations that are applicable with regard to radiological safety. In the case the facility does not belong to the organising entity, the existence of an agreement between the latter and the owner of the

former for the carrying out of the practicals must be documentarily proven.

There shall be a sufficient number of radiation detection equipment and of all of the devices and accessories needed to achieve the goals set in the practicals.

Attendance control: The Management of the course shall control the attendance of students to the theory and practice sessions and must have documentary justification of their attendance to at least 90% of the sessions.

Assessment system: The assessment of the theoretical and practical knowledge acquired by the students will take place by means of the grade obtained in a written test consisting of 60 questions, one hour being the allotted time for the completion thereof. The questions shall be selected from a question bank belonging to the entity according to the mode and level of the course given, and shall consist of a clause and four possible answers, of which only one will be true.

The content of the questions shall cover the subjects taught in the theory and practice classes and their number will depend on the hours allocated thereto in the syllabus.

In order to pass the test, it is necessary to answer correctly at least 75% of the questions.

Those students who have not passed the test in the first round may opt to take a second test within a maximum period of six months.

The Test Record shall be sent to the CSN within fifteen days after the date of the test, which shall be accompanied, for those students who have got a pass, by a copy of their official titles or academic certificates in accordance with that established in Section Fifth (Students) of the present Instruction. The Test Record, signed by the Technical Director of the course, shall contain the following:

Information regarding the course:

Mode and level.

Dates on which it was given.

Examination date.

Entities where the theory and practice sessions have been given.

Code of the entity and number of the order of the corresponding Record in that mode and level.

Information regarding the students:

List of students who have attended the course and of students from previous courses that are taking the test. In this last case, the date when the course they attended was given shall be indicated.

The list shall include their name, surnames, Spanish identity card number and degree.

Information regarding the test:

Proposed test.

Results obtained by each of the students (percentage of correct answers).

The Management of the course must have, from the first day on which the course is given, a certified copy of the students' official titles or academic certifications as well as a file on each student with his/her personal data and address, the type of course in which he/she has enrolled (mode and level) and the date thereof. The date of the tests and his/her grades will be subsequently added to this file.

Accreditation certificate: The organising entity shall issue to every person having passed the assessment test an accreditation certificate with its stamp and the Technical Director’s signature, which will follow the model in Attachment D "Accreditation certificate model”, where his/her name and two surnames, Spanish identity card number and degree shall be recorded. The entity shall keep a copy of said certificate in its files.

The level, mode and start and end dates of the course as well as the date of the decision on the recognition thereof shall be explicitly indicated in said certificate.

It shall also be indicated that the interested party is accredited to either manage or operate X-ray devices for medical diagnosis purposes in accordance with that established in Articles 13 and 14 of Royal Decree 1891/1991, of 30th December(replaced by Royal Decree 1085/2009 of 3rd of July).

Likewise, it shall be recorded that the credentials are granted exclusively for radiological protection purposes, without prejudice to the qualifications and requirements that might be required in each case at the professional level and due to the techniques applied.

Records keeping: The organising entity shall file the final assessment tests and the documentation referred to in the preceding Sections and keep them at the CSN's disposal for five years.

The copy of the accreditation certificates shall be filed for 30 years, and in case of the closure of the organising entity, it shall be handed over to the CSN.

Ninth. Educational entities recognised by the Administration.- The academic authorities and educational administrations that have official educational or specialisation courses or programs established in their syllabuses containing the subjects that are included in any of the modules of Attachment B may apply to the CSN for the recognition thereof for the purposes envisaged in this Instruction.

To this end, the application shall be made in accordance with that established in the Section Sixth of the present Instruction, with the same requirements included in Section Fifth, except the part referring to the students that are going to obtain a degree in the indicated specialities. The certificate of accreditation to operate or manage shall be issued by the educational entity that gives the recognized course once the student has obtained the corresponding degree.

TITLE III

Persons susceptible of being directly accredited

Tenth. Curricular path.- Graduates in Medicine and Surgery, Odontology or Veterinary Science and chiropodists who, at the

entry into force of Royal Decree 1891/1991(replaced by Royal Decree 1085/2009),, have a minimum of 5 years of professional experience and in turn are able to submit documentary proof of having taken specialisation courses on the subjects listed in module I.A or module II.A of Attachment B - depending on the mode - may apply to the Nuclear Safety Council for the credentials to manage the operation of X-ray facilities for medical diagnosis purposes.

Likewise, registered nurses that provide documentation in the same terms of the preceding paragraph may apply to the Nuclear Safety Council for the credentials to operate said facilities, taking into account the subjects listed in module 1-B or module II.B of Attachment B - depending on the mode.

The application for credentials based on education and professional experience must be accompanied by a copy of the Spanish identity card, the documentation proving the time worked in the corresponding field, and the content and duration of the specialisation courses alluded to in this Section.

The Nuclear Safety Council shall pass the corresponding accreditation decision in a period of two months from the proper and full submittal of the required documentation.

Eleventh. Specialisation path.- Graduates in Medicine and Surgery, specialists in Electronic radiology or Radiodiagnosis, may apply to the Nuclear Safety Council for the credentials to manage the operation of X-ray facilities for medical diagnosis purposes, for which they will attach a copy of their Spanish identity card and a certified copy of the speciality degree or a certification in proof thereof issued by the Ministry of Education and Science.

Likewise, technicians specialised in Radiodiagnosis, healthcare assistants and registered nurses having a diploma in Electrology and Radiology obtained in accordance with Royal Decree 1153/1961, of 22nd June, and a diploma in Higher Diagnosis Imaging Engineering obtained in accordance with Royal Decree 565/1995, of 7th April, may apply to the Nuclear Safety Council for the credentials to operate X-ray facilities for medical diagnosis purposes. Likewise, the application for credentials will be accompanied by a copy of the Spanish identity card and a certified

copy of the corresponding official degrees or a certification in proof thereof issued by the Ministry of Education and Science.

The Nuclear Safety Council shall pass the corresponding accreditation decision in a period of two months from the proper and full submittal of the required documentation.

Twelfth. Degrees issued outside Spain.- Official degrees and academic certifications obtained outside Spain shall be deemed valid in Spain once they meet the requirements of the legislation currently in force on the official recognition of degrees issued by the Ministry of Education and Science.

The people that have degrees recognised according to the preceding paragraph and prove at the same time that they have taken specialisation courses on the subjects listed in any of the modules of Attachment B - depending on the mode - may apply to the CSN for the corresponding credentials to manage or operate the running of X-ray facilities for medical diagnosis purposes in accordance with the requirements established for students in Section Fifth of the present Instruction.

Said application shall be accompanied by a copy of the Spanish identity card and a certified copy of the mentioned documents.

The Nuclear Safety Council shall pass the corresponding accreditation decision in a period of two months from the proper and full submittal of the required documentation.

TITLE IV

Regulatory control

Thirteenth. Inspection and control.- Within the scope of its competences, the Nuclear Safety Council may carry at any time the verifications it deems appropriate in order to verify the compliance with that established in the present Instruction and in the specifications attached to the Decision of the granted Recognition.

Fourteenth. Infractions and sanctions.- The present Nuclear Safety Council Instruction is binding in accordance with that established in Article 2.a) of Law 15/1980, of 22nd April, creating the Nuclear Safety Council, such that the failure to comply with it shall be

punished in accordance with the provisions of Chapter 14 (Articles 85 to 93) of Law 25/1964, of 29th April, on Nuclear Energy, in the phrasing given to it by Law 33/2007, of 7th November, reforming Law 15/1980, of 22nd April.

First Transitory Provision.

For the purposes envisaged in Article 14 of Royal Decree 1891/1991(replaced by Royal Decree 1085/2009), the recognitions granted by the Nuclear Safety Council of the training courses for supervisors and operators of general radiodiagnosis and dental radiodiagnosis facilities, authorised prior to the entry into force of the Nuclear Safety Council's Ruling, of 5th November 1992, setting the rules which the recognition of courses or programmes entitling to manage and operate X-ray facilities for medical diagnosis and the accreditation of the personnel that perform said functions shall have to abide by (BOE no. 274, of the 14th of November of 1992) as well as the courses or programmes officially recognized under said Ruling, are still in force.

Second Transitory Provision.

The entities having recognized courses or programmes must update their technical contents and means in accordance with the provisions of the present Instruction. The content of the educational documentation of the course, once updated, must be sent to the CSN in a maximum period of one year from the date of the entry into force of the present Instruction.

Third Transitory Provision.

The holders of training diplomas or certificates that have been issued in accordance with courses recognized prior to the Nuclear Safety Council's Ruling of 5th November 1992 shall request this Body to acknowledge said diplomas or certificates; therefore, both the date of the official authorisation of the course and that the training is granted to either manage or operate X-ray facilities for medical diagnosis shall be recorded, provided the holders fulfil the qualification requirements called for in the fifth Article of said Ruling.

Repealing Provision.

The Nuclear Safety Council's Ruling, of 5th November 1992, setting the rules which the recognition of courses or programmes entitling to manage and operate X-ray facilities for medical diagnosis and the direct accreditation of the personnel that perform said functions shall have to abide by, as well as the Nuclear Safety Council's Ruling, of 1st October 1993, modifying the mentioned Ruling of 5th November 1992, are repealed.

Sole Final Provision.

The present Instruction shall come into force on the day following that of its publication in the "Official State Gazette".

Which I announce to inform you for all pertinent purposes.

In Madrid, on the 30th of January of 2008.- Carmen Martínez Ten, the President of the Nuclear Safety Council.

ATTACHMENT A

Protocol for the recognition of courses

1. Organisation.

1.1 The name of the organising entity or institution. Tax identification number.

1.2 Registered office, telephone number, fax number.

2. Address.

2.1 Name and Spanish identity card number of the Technical Director.

2.2 Curriculum vitae.

2.3 Postal address.

2.4 Telephone number, fax number, e-mail address.

3. Mode.

3.1 General radiodiagnosis.

3.2 Dental or chiropodial radiodiagnosis. (Specify)

4. Level: managing or operating. (Specify)

5. Expected number of students and identification of practicals groups.

6. Teaching staff.

6.1 Name of the teacher, Spanish identity card number, and university degree.

6.2 Documentation proving the professional teaching experience, in particular in the area which the person is going to be responsible for in accordance with that established in the Section Fifth of this Instruction.

7. 7. A detailed syllabus where the following appears for every theory or practice session: name, teacher, and daily and hourly arrangement.

(Send the information preferably by using the format of Table I of Attachment A.)

8. Characteristics of the rooms where the sessions will be given (capacity, location, audiovisual means, etc.).

9. Facility where the practicals will take place.

9.1 Name of the facility.

9.2 Address.

9.3 Owner of the facility.

9.4 Justification for it being registered in the “Register of X-ray facilities for medical diagnosis”.

9.5 Documentary justification of the agreement between the entity organising the course and the facility, in the case the latter does not belong to the former.

10. Material available for the practicals needed in order to develop the corresponding programmes for the different modes.

10.1 Radiodiagnosis equipment.

10.2 Radiation detection and measurement equipment.

10.3 Accessories and auxiliary items available (leaded aprons and gloves, deflecting material, dosimeters, etc.).

11. Educational documentation that will be handed to the students (a complete copy of theory lessons and outlines of the practicals shall be sent).

12. A proposal of at least five test questions for each of the areas in the syllabuses of the theory sessions and twenty five questions on the practice sessions.

Date:

Signature of the Technical Director of the Course

Stamp of the entity:

Table 1 (of Attachment A). Syllabus	
HOUR (**)	
DATE (**)	
TEACHER	
NUMBER OF HOURS	
PRACTICE SESSION (*)	
THEORY SESSION	
(*) Reference with the number assigned to each section of the syllabus. (**) This information shall be notified at least 20 days before the start of the course.	

ATTACHMENT B

Content of the training programmes

Module I.A - Content of the programme for training to manage X-ray facilities for general diagnosis purposes

Theory sessions:

Area 1. Basic concepts:

Generation and properties of X rays.

The nature of X rays. The interaction of X rays with matter: basic concepts.

The attenuation of radiation.

The formation of the radiological image.

Area 2. Physical characteristics of X-ray beams and equipment:

Generator.

Tube. Associated devices.

Characteristics of the radiation produced by X-ray tubes.

Imaging systems.

Area 3. Radiation magnitudes and measurement:

Radiological magnitudes and units applicable to radiodiagnosis. The concept of dose.

Radiation detection and measurement. Physical fundamentals.

Measurement equipment. Direct beam dose measurement.

Surface dose measurement. Personal dosimeters.

Area 4. Biological effects of ionising radiations:

General aspects of the interaction of radiation with the biological environment.

Somatic and genetic effects.

Stochastic and non-stochastic effects.

Area 5. Basic regulations and laws in radiodiagnosis facilities:

Law 25/1964, on Nuclear Energy.

Law 33/2007, of 7th November, modifying Law 15/1980, of 22nd April, creating the Nuclear Safety Council (BOE no. 268, of 8th November 2007).

Royal Decree 783/2001, approving the Regulation on health protection against ionising radiations.

Royal Decree 1838/1999, approving the Regulation governing nuclear and radioactive facilities.

Royal Decree 1891/1991(replaced by Royal Decree 1085/2009), on the installation and use of X-ray devices for medical diagnosis.

Royal Decree 1132/1990, establishing basic measures for the radiological protection of people subjected to medical examinations and treatments.

Royal Decree 1976/1999, establishing the criteria for quality in radiodiagnosis.

Royal Decree 413/1997, on the operational protection of external workers under the risk of exposure to ionising radiations as a result of intervening in the controlled area.

Order of the Ministry of Health and Consumption, of 12th July 1982, on radiological explorations in School Medicine and Hygiene.

Order of the Ministry of Relations with Parliament and Government Secretariat, of 18th October 1989, abolishing systematic radiological explorations in health checks of a preventive nature.

Applicable CSN regulations.

Area 6. Basic radiological protection:

Goals.

Principles: Justification; Optimisation; Dose limitation system.

Basic operational radiological protection rules (Regulation on health protection against ionising radiations).

General criteria for dose reduction.

Area 7. Specific radiological protection in radiodiagnosis facilities:

General considerations.

Design of facilities.

Technical characteristics of radiodiagnosis rooms.

Development of operational radiological protection. Organisation and control.

Preventive and corrective maintenance.

Procedures for reducing the dose received by patients.

Radiological protection considerations in facilities using particular techniques:

Digital radiology:

Concept and applications.

Fundamentals and techniques of radiological exploration by means of equipment with digital technology.

Paediatric techniques.

Special techniques such as tomography, xeroradiography, radioscopy or contrast radiography.

Techniques that use intervention procedures such as angiography or phlebography.

Other diagnostic and intervention techniques.

Particular considerations with regard to the protection of the patient (genetically significant doses, potential pregnancies, ICRP recommendations-diverse publications nos. 34, 85, 87, etc.).

Area 8. Quality assurance programme:

Implementing a quality assurance programme.

The justification for quality control.

Organising and developing a quality assurance programme.

Determining the quality of the spectrum.

Determining the peak voltage.

Determining the time-intensity product.

Photo exposure meter.

The quality of the image.

Developers.

The darkroom.

The storage of film.

The visual perception of the quality of the image.

Area 9. Technical-administrative requirements:

Procedure for the declaration and registration of medical diagnosis X-ray equipment and facilities.

Technical specifications:

Personnel requirements.

Rules of performance. Operation logbook. Files and reports.

Periodic and special verifications.

Protection devices and clothing.

Content of the practice sessions:

Operation of the different types of radiation monitors that are used in radiology; interpreting the results of the measurements. Criteria for using the most suitable equipment for each case.

Estimation of the doses that operations personnel and the members of the public could receive, considering the weekly workload and the results of the environmental radiation measurements. Use and occupation factors. Verification of the efficiency of structural shielding and personal protection items.

Classification and signposting of areas in the radiology facility.

Verification of the variation in the dose intensity due to scattered radiation according to the size of the irradiated field and operating parameters (kilovoltage, milliamperage, time) and, likewise, with regard to the position of the operator in relation to the source and the patient.

Application of basic operating procedures that entail a reduction of doses and prevent the repetition of plates (collimation, appropriate technique).

Knowledge of the operating parameters of a processor in order to be able to control them, such as temperature, pH and developer liquid regeneration.

Interpreting the results of some basic quality controls (kilovoltage, shooting time, reproducibility, reciprocity, coincidence of light and radiation fields, performance).

Application of criteria to estimate the quality of radiographic images by using the appropriate patterns. Using systems for obtaining and recording images.

Module I.B - Content of the programme for training to operate X-ray facilities for general diagnosis purposes

Theory sessions:

Area 1. Basic concepts:

Generation and properties of X rays.

The nature of X rays. The interaction of X rays with matter: basic concepts.

The attenuation of radiation.

The formation of the radiological image.

Area 2. Physical characteristics of X-ray beams and equipment:

Generator.

Tube. Associated devices.

Characteristics of the radiation produced by X-ray tubes.

Imaging systems.

Area 3. Radiation magnitudes and measurement:

Radiological magnitudes and units applicable to radiodiagnosis. The concept of dose.

Radiation detection and measurement. Physical fundamentals.

Measurement equipment. Direct beam dose measurement. Surface dose measurement. Personal dosimeters.

Area 4. Biological effects of ionising radiations:

General aspects of the interaction of radiation with the biological environment.

Somatic and genetic effects.

Stochastic and non-stochastic effects.

Area 5. Basic regulations and laws in radiodiagnosis facilities:

Law 25/1964, on Nuclear Energy.

Law 33/2007, of 7th November, modifying Law 15/1980, of 22nd April, creating the Nuclear Safety Council (BOE no. 268, of 8th November 2007).

Royal Decree 783/2001, approving the Regulation on health protection against ionising radiations.

Royal Decree 1838/1999, approving the Regulation governing nuclear and radioactive facilities.

Royal Decree 1891/1991(replaced by Royal Decree 1085/2009), on the installation and use of X-ray devices for medical diagnosis.

Royal Decree 1132/1990, establishing basic measures for the radiological protection of people subjected to medical examinations and treatments.

Royal Decree 1976/1999, establishing the criteria for quality in radiodiagnosis.

Applicable CSN regulations.

Area 6. Basic radiological protection:

Goals.

Principles: Justification; Optimisation; Dose limitation system.

Basic operational radiological protection rules (Regulation on health protection against ionising radiations).

General criteria for dose reduction.

Area 7. Specific radiological protection in radiodiagnosis facilities:

General considerations.

Design of facilities.

Technical characteristics of radiodiagnosis rooms.

Development of operational radiological protection. Organisation and control.

Preventive and corrective maintenance.

Particular considerations with regard to the protection of the patient (genetically significant doses, potential pregnancies, ICRP recommendations-diverse publications nos. 34, 85, 87, etc.).

Area 8. Quality assurance programme:

Implementing a quality assurance programme.

The justification for quality control.

Developing a quality assurance programme.

Determining the quality of the spectrum.

Determining the peak voltage.

Determining the time-intensity product.

Photo exposure meter.

The quality of the image.

Developers.

The darkroom.

The storage of film.

The visual perception of the quality of the image.

Area 9. Technical-administrative requirements:

Technical specifications:

Personnel requirements.

Rules of performance. Operation logbook. Files and reports.

Periodic and special verifications.

Protection devices and clothing.

Content of the practice sessions:

Operation of the different types of radiation monitors that are used in radiology; interpreting the results of the measurements. Criteria for using the most suitable equipment for each case.

Estimation of the doses that operations personnel and the members of the public could receive, considering the weekly workload and the results of the environmental radiation measurements. Use and occupation factors. Verification of the efficiency of structural shielding and personal protection items.

Classification and signposting of areas in the radiology facility.

Verification of the variation in the dose intensity due to scattered radiation according to the size of the irradiated field and operating parameters (kilovoltage, milliamperage, time) and, likewise, with regard to the position of the operator in relation to the source and the patient.

Application of basic operating procedures that entail a reduction of doses and prevent the repetition of plates (collimation, appropriate technique).

Knowledge of the operating parameters of a processor in order to be able to control them, such as temperature, pH and developer liquid regeneration.

Interpreting the results of some basic quality controls (kilovoltage, shooting time, reproducibility, reciprocity, coincidence of light and radiation fields, performance).

Application of criteria to estimate the quality of radiographic images by using the appropriate patterns. Using systems for obtaining and recording images.

Module II.A - Content of the programme for training to manage X-ray facilities for dental or chiropodial diagnosis purposes

Theory sessions:

Area 1. Basic concepts:

Generation and properties of X rays.

The nature of X rays. The interaction of X rays with matter: basic concepts.

The attenuation of radiation.

The formation of the radiological image.

Area 2. Physical characteristics of X-ray beams and equipment:

Generator.

Tube. Associated devices.

Characteristics of the radiation caused by X-ray tubes.

Imaging systems.

Area 3. Radiation magnitudes and measurement:

Radiological magnitudes and units applicable to radiodiagnosis. The concept of dose.

Radiation detection and measurement. Physical fundamentals.

Measurement equipment. Direct beam dose measurement. Surface dose measurement. Personal dosimeters.

Area 4. Biological effects of ionising radiations:

General aspects of the interaction of radiation with the biological environment.

Somatic and genetic effects.

Stochastic and non-stochastic effects.

Area 5. Basic regulations and laws in radiodiagnosis facilities:

Law 25/1964, on Nuclear Energy.

Law 33/2007, of 7th November, modifying Law 15/1980, of 22nd April, creating the Nuclear Safety Council (BOE no. 268, of 8th November 2007).

Royal Decree 783/2001, approving the Regulation on health protection against ionising radiations.

Royal Decree 1838/1999, approving the Regulation governing nuclear and radioactive facilities.

Royal Decree 1891/1991(replaced by Royal Decree 1085/2009), on the installation and use of X-ray devices for medical diagnosis.

Royal Decree 1132/1990, establishing basic measures for the radiological protection of people subjected to medical examinations and treatments.

Royal Decree 413/1997, on the operational protection of external workers under the risk of exposure to ionising radiations as a result of intervening in the controlled area.

Royal Decree 1976/1999, establishing the criteria for quality in radiodiagnosis.

Ministry of Health and Consumption Order, of 12th July 1982, on radiological explorations in School Medicine and Hygiene.

Order of the Ministry of Relations with Parliament and Government Secretariat, of 18th October 1989, abolishing systematic radiological explorations in health checks of a preventive nature.

Applicable CSN regulations.

Area 6. Basic radiological protection:

Goals.

Principles: Justification; Optimisation; Dose limitation system.

Basic operational radiological protection rules (Regulation on health protection against ionising radiations).

General criteria for dose reduction.

Area 7. Specific radiological protection in dental or chiropodial radiodiagnosis facilities:

General considerations.

Design of facilities.

Technical characteristics of radiodiagnosis rooms.

Development of operational radiological protection. Organisation and control.

Preventive and corrective maintenance.

Procedures for reducing the dose received by patients.

Radiological protection considerations in facilities using particular techniques:

Digital radiology:

Concept and applications.

Fundamentals and techniques of radiological exploration by means of equipment with digital technology.

Paediatric techniques.

Other diagnostic and intervention techniques.

Particular considerations with regard to the protection of the patient (genetically significant doses, potential pregnancies, ICRP recommendations-diverse publications nos. 34, 85, 87, etc.).

Area 8. Quality assurance programme:

Implementing a quality assurance programme.

The justification for quality control.

Organising and developing a quality assurance programme.

Determining the quality of the spectrum.

Determining the peak voltage.

Determining the time-intensity product.

Photo exposure meter.

The quality of the image.

Developers.

The darkroom.

The storage of film.

The visual perception of the quality of the image.

Area 9. Technical-administrative requirements:

Procedure for the declaration and registration of medical diagnosis X-ray equipment and facilities.

Technical specifications:

Personnel requirements.

Rules of performance. Operation logbook. Files and reports.

Periodic and special verifications.

Protection devices and clothing.

Content of the practice sessions:

Operation of the different types of radiation monitors that are used in radiology; interpreting the results of the measurements. Criteria for using the most suitable equipment for each case.

Estimation of the doses that operations personnel and the members of the public could receive, considering the weekly workload and the results of the environmental radiation measurements. Use and occupation factors. Verification of the efficiency of structural shielding and personal protection items.

Classification and signposting of areas in the radiology facility.

Verification of the variation in the dose intensity due to scattered radiation according to the size of the irradiated field and operating parameters (kilovoltage, milliamperage, time) and, likewise, with regard to the position of the operator in relation to the source and the patient.

Application of basic operating procedures that entail a reduction of doses and prevent the repetition of plates (collimation, appropriate technique).

Knowledge of the operating parameters of a processor in order to be able to control them, such as temperature, pH and developer liquid regeneration.

Interpreting the results of some basic quality controls (kilovoltage, shooting time, reproducibility, reciprocity, coincidence of light and radiation fields, performance).

Application of criteria to estimate the quality of radiographic images by using the appropriate patterns. Using systems for obtaining and recording images.

Module II.A - Content of the programme for training to operate X-ray facilities for dental or chiropodial diagnosis purposes

Theory sessions:

Area 1. Basic concepts:

Generation and properties of X rays.

The nature of X rays. The interaction of X rays with matter: basic concepts.

The attenuation of radiation.

The formation of the radiological image.

Area 2. Physical characteristics of X-ray beams and equipment:

Generator.

Tube. Associated devices.

Characteristics of the radiation caused by X-ray tubes.

Imaging systems.

Area 3. Radiation magnitudes and measurement:

Radiological magnitudes and units applicable to radiodiagnosis. The concept of dose.

Radiation detection and measurement. Physical fundamentals.

Measurement equipment. Direct beam dose measurement. Surface dose measurement. Personal dosimeters.

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General aspects of the interaction of radiation with the biological environment.

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Royal Decree 1132/1990, establishing basic measures for the radiological protection of people subjected to medical examinations and treatments.

Royal Decree 1976/1999, establishing the criteria for quality in radiodiagnosis.

Applicable CSN regulations.

Area 6. Basic radiological protection:

Goals.

Principles: Justification; Optimisation; Dose limitation system.

Basic operational radiological protection rules (Regulation on health protection against ionising radiations).

General criteria for dose reduction.

Area 7. Specific radiological protection in dental or chiropodial radiodiagnosis facilities:

General considerations.

Technical characteristics of radiodiagnosis rooms.

Development of operational radiological protection.

Preventive and corrective maintenance.

Procedures for reducing the dose received by patients.

Radiological protection considerations in facilities using particular techniques:

Digital radiology:

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Area 8. Quality assurance programme:

Implementing a quality assurance programme.

The justification for quality control.

Developing a quality assurance programme.

Determining the quality of the spectrum.

Determining the peak voltage.

Determining the time-intensity product.

Photo exposure meter.

The quality of the image.

Developers.

The darkroom.

The storage of film.

The visual perception of the quality of the image.

Area 9. Technical-administrative requirements:

Technical specifications:

Personnel requirements.

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Content of the practice sessions:

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Knowledge of the operating parameters of a processor in order to be able to control them, such as temperature, pH and developer liquid regeneration.

Interpreting the results of some basic quality controls (kilovoltage, shooting time, reproducibility, reciprocity, coincidence of light and radiation fields, performance).

Application of criteria to estimate the quality of radiographic images by using the appropriate patterns. Using systems for obtaining and recording images.

ATTACHMENT C. Planning of the courses				
Mode	Level	No. of theory session hours	No. of practice session hours	No. of total hours
General radiodiagnosis	Manage	20	5	25
	Operate	18	5	23
Dental or chiropodial radiodiagnosis.	Manage	14	4	18
	Operate	13	4	17