



# PETRUS-III PROJECT

(Contract Number: FP7 - 605265)

## Deliverable: D.5.2

### Integration to European Master Label

Nature of the deliverable		
<b>R</b>	Report	X
<b>P</b>	Prototype	
<b>D</b>	Demonstrator	
<b>O</b>	Other	

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Reporting period: month 24

Date of issue of this report: 01/12/2015

Start date of project: 01/09/2013

Duration: 36 Months

Project co-funded by the European Commission under the Euratom Research and Training Programme on Nuclear Energy within the Seventh Framework Programme		
Dissemination Level		
<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the partners of the PETRUS III project	
<b>CO</b>	Confidential, only for partners of the PETRUS III project	

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Deliverable D5.2 Version n° 1

Dissemination level:

Date of issue of this report: **01/12/15**

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Deliverable D5.2 Version n° 1

Dissemination level:

Date of issue of this report: **01/12/15**

2/26



Scope	WP5.2	Version:	V1
Type/No.	Report	Total pages	26
Title:	Integration to European Master Label	Chapters:	
Filename:	PETRUSIII_WP5_D5.2	Suppl. pages:	
Internet		Phase	

## **ABSTRACT:**

This deliverable describes proposals of certifications to be released by ENEN in the field of Radioactive Waste Geological Disposal, basing on the educational curriculum described in deliverable D1.4 - D1.5.

In particular, two certifications are proposed, envisaging a “quality label” for continuous professional development and a “quality label” to be released after the achievement of a MSc degree.

Preliminary suggestions for the establishment of the certifications are drafted, basing on the experience gained by ENEN in releasing the quality label of European Master of Science in Nuclear Engineering (EMSNE). More detailed information will be included in this report after receiving feedback from project Participants about the present suggestions.

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## **INTERNAL REFERENCES:**

## Signatures

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## Document history

Identifier	Date	Short description

## Abbreviations

<b>KSC</b>	Knowledge Skills Competencies
<b>LO</b>	Learning Outcomes
<b>ENEN</b>	European Nuclear Education Network.
<b>DoW</b>	Description of Works
<b>ECTS</b>	European Credit Transfer System
<b>ECVET</b>	European Credit System for Vocational Education and Training

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## 1. Introduction

Attracting students to nuclear careers is an important issue which has attained the level of a real emergency in Europe nowadays. Contributing to prepare a skilled nuclear workforce for coping with the challenges that nuclear energy will face in the next future, including the retirement of expert personnel and the need to develop safer and more sustainable nuclear installations, is a specific mission of the European Nuclear Education Network (ENEN).

In this frame, supporting and coordinating the activities of universities, research centres and industry in Education and Training, aiming at stimulating synergies and optimising the use of resources, represents for ENEN an action of overwhelming importance.

Recently, ENEN has been also proposed to become the body that can provide adequate sustainability to the different actions performed in the frame of EU Projects related to E&T (e.g., the European Fission Training Schemes, EFTS), aiming to assure continuity when their activities will be completed, by maintaining and activating the related courses for a longer period of time. In particular, this is one of the specific roles that ENEN is playing within the present PETRUS-III project, preparing the Association to host the PETRUS consortium in its structures after completion of the project.

Among the different actions aiming at this objective and already tackled in discussions had during the PETRUS-III Project Meetings, the establishment of certifications for the studies in the field of Radioactive Waste Geological Disposal represents an important step in view of providing a first form of accreditation to the studies performed in the field.

In this regard, the PETRUS III Consortium has already established an approach to education and training based on (i) the modularity of courses and the search for common qualification criteria, (ii) the establishment of a common mutual recognition system, (iii) the aim to facilitate the mobility for trainers and trainees and (iv) the feedback received or to be received from the 'employers'. This approach shares common principles and practices with the work developed so far within the European Nuclear Education Network (ENEN) Association.

On this basis, the work described in this deliverable consists in the proposal of possible options for integrating the PETRUS Educational Program within the current European “quality label” practices at Master or continuous professional development level in Europe.

In particular, as suggested in the DoW of the PETRUS-III Project, “the consortium will work on the adaptation of the ‘European Master of Science in Nuclear Disciplines’ label developed by the Association for its use in the frame of radioactive waste disposal’. In this frame, indeed, the leading experience within ENEN is represented by the establishment of the European Master of Science in Nuclear Engineering (EMSNE) certification, which resulted in a “supra-national” title released by the Association to those Engineers whose studies comply with some “by-laws” specifically set up for the purpose. The increasing number of engineers who, after completion of their studies, successfully apply for the certification, testifies for the success of this action, though more should be done to promote a better uniformity in the appeal of the certification throughout Europe.

Stimulated by the good results of this effort, the ENEN Association is now considering proposing its structure at the service of nuclear fields other than nuclear engineering, considering the variety of disciplines in which nuclear studies are presently conjugated. Being a “supra-national” Association, in fact, ENEN can propose certifications based on principles agreed among relevant stakeholders throughout Europe, though not necessarily valid under any Member Country legislation. This step is intended to be precursory for and independent of any possible future adaptation of national legislations to the agreed standards, allowing for the promotion of a cross-border mutual recognition that may become later a stimulus for legislative harmonisation.

The above is in short summary the rationale at the basis of the proposals of certifications advanced in this report, whose form must be intended preliminary, since they must be further elaborated by the PETRUS Consortium, finally selecting among the different possible options the one more suitable for the specific character of the proposed curriculum. There is no doubt that these proposals reflect at a large extent the present lines of thought within ENEN in the field of nuclear Education and Training, as well as the specific request of long term sustainability coming to ENEN from the PETRUS Consortium.

## 2. The PETRUS III Educational Program

The PETRUS III Educational Program has been designed based on the qualification of ‘Safety Engineer – Assessment and Performance Analysis for construction license of a selected site’ (Deliverable D1.4 – 1.5).

This safety engineer is specialised in integrating and analysing site specific geochemical and hydrogeological data, as an input for carrying out numerical modelling and calculations for dose estimation under various scenarios for a repository.

The Educational Program is structured into three units:

- Unit 1: Basics;
- Unit 2: Foundation for radioactive waste disposal;
- Unit 3: Safety and performance analysis for radioactive waste disposal.

The content of the three units is shortly summarised, as described in the related deliverable D1.4-D1.5.

### Unit 1: Basics

This first unit constitutes the basic learning outcomes for a quantitative safety assessment, in particular for the quantification of the migration of radionuclides. This includes knowledge of the rock characteristics, water/rock interactions and underground water flow. The content of this basic unit is classically covered in master programs specialized in hydrogeology. Thus, nuclearization of professionals with hydrogeology background seems to be adequate for the designed qualification.

#### Unit 1: Basics – 70 hours

- Understand the host rock / site physical and chemical characteristics - 12 hours
- Understand water/rock interaction - 18 hours
- Understand the basics of hydrogeology - 10 hours
- Understand hydrogeological modelling - 30 hours

## **Unit 2: Foundation for radioactive waste disposal**

This second unit includes the fundamental learning outcomes on radioactivity, safety, waste disposal sites, the engineered barrier system (EBS) and site evolution with time. Unit 2 constitutes the core Unit for **nuclearization** of professionals originating from non-nuclear industrial fields.

### Unit 2: Foundation for radioactive waste disposal – 60 hours

- The phenomenon of radioactivity and fuel cycle - 10 hours
- Basics of risk assessment and management - 10 hours
- The concept of engineered barrier system (EBS) - 10 hours
- Safety requirements for disposal of radioactive waste, Safety assessment and safety case – 10 hours
- Situations description and scenarios - 6 hours
- Safety functions and indicators - 6 hours
- The THMCGRB multi processes - 8 hours

## **Unit 3: Safety and performance analysis for radioactive waste disposal**

This third Unit is based on the learning outcomes of Unit 1 and Unit 2 including data gathering and management, mathematical and numerical modelling, uncertainties and quality management.

### Unit 3: Safety and performance analysis for radioactive waste disposal – 90 hours

- Data gathering and management – 10 hours
- Select and use physical, mathematical and numerical models for assessment of the performance of a repository – 50 hours
- Uncertainties management – 20 hours
- Quality management strategies and procedures – 10 hours

### 3. The European “Quality Label” of EMSNE

The European Master of Science in Nuclear Engineering (EMSNE) is a Certificate delivered by the European Nuclear Education Network Association, with the endorsement of all its members, in order to certify the highest quality standards of Nuclear Engineering Education and the European dimension achieved by the EMSNE laureate.

In the by-laws of the EMSNE Certification the following criteria are stated to be satisfied to obtain the certification (see Annex I):

*“Art. 6 The main requirement for awarding the EMSNE-EC is that the applicant has obtained a Master Degree in Nuclear Engineering, or equivalent, delivered by or in co-operation with an academic institution which is a member of the ENEN-A, or at an academic institution that is a member of a cluster of academic institutions which is a member of the ENEN-A, as described in Article 3.1 of the Statutes of the ENEN A. This academic institution is hereafter called the home institution.*

*In case the applicant has obtained a double, a multiple or a joint Master Degree in Nuclear Engineering, or equivalent, issued by more than one academic institution, the applicant must designate one of these academic institutions as the home institution, provided that this institution meets the requirements of the first paragraph of this article.*

*Art. 7 The additional requirements for awarding the EMSNE-EC are:*

- a. the total load of the study programme of the applicant leading to the degree of Master in Nuclear Engineering, or equivalent, is at least 300 ECTS credits at university level (besides the exception mentioned in Art. 8);*
- b. of which at least 60 ECTS credits (which may include the master thesis project) are in nuclear sciences and technology, preferably engineering, at master level;*
- c. of which at least 20 ECTS credits (which may include the master thesis project) are taken at one or more academic institutions or clusters of such academic institutions, that are effective members of the ENEN-A, other than the home institution and in a different country than the home institution;*
- d. the applicant has successfully defended a nuclear engineering master thesis project;*

e. the courses referred to in Art. 7.b cover at least the following fields of study:

- Nuclear Power Plant Technology & Reactor Engineering,
- Reactor Physics,
- Nuclear Thermal Hydraulics,
- Safety and Reliability of Nuclear Facilities,
- Reactor Engineering Materials,
- Radiology and Radiation Protection,
- Nuclear Fuel Cycle and applied radiochemistry.

f. laboratory work on some of the above fields of study.

Art. 8 Exceptions to the minimum total academic course load of 300 ECTS credits as described in Art. 7a can be made only if the TAAC is of the motivated opinion that the academic programme followed by the candidate is equivalent to a 300 ECTS credits university programme representative for the academic ENEN A members.”

In summary, the engineer to be awarded the EMSNE title should have covered a rather complete “curriculum studii” in terms of basic matters and should have achieved a “European dimension” in his/her studies such as to become acquainted with the international field in which he/she will operate during working life.

A simple graphical representation of the criteria is provided in Figure 1.

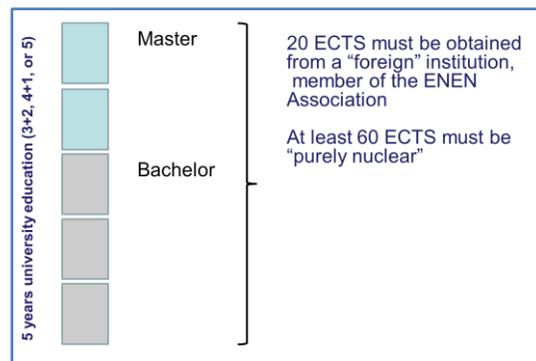


Figure 1. Sketch of a typical studii curriculum suitable for achieving the EMSNE certification

Notwithstanding the example reported in the figure, different paths may be followed to achieve the certification. In particular, it is worth to mention that the Belgian Nuclear Education Network

(BNEN) has organised a 60 ECTS “Master after Master” in which engineers from different branches can acquire the 60 purely nuclear ECTS and have international exchanges, thus making them satisfying the above requirements. So, the ways for achieving the EMSNE certification can be different.

The fulfilment of the above criteria is checked yearly by the Teaching and Academic Affair Committee (TAAC) of ENEN, which analyses the applications received within a specific deadline. The results of this analysis are announced at the General Assembly of ENEN, where the names of the engineers to be awarded are proclaimed.

#### **4. The PETRUS-III Educational Program as a basis for an ENEN Certification**

The Educational program of PETRUS III Consortium can be considered from different points of view as a basis for an ENEN certification. In particular, the following possible certifications can be envisaged:

- certification for continuous professional development;
- certification in the frame of a MSc academic degree.

##### **4.1 European certification for continuous professional development**

This option is conceived as a stand-alone certification to be acquired at some prescribed level of education and to be possibly certified in a “skill passport”. The release of the certification will be subjected to the verification of the acquired ECVET units, in terms of knowledge skills and competencies, and of a sufficient level in University background. In particular, considering that the EQF levels involved in the courses range from 4 to 6, with prevailing levels of 5 and 6, it is recommended that a minimum starting level of BSc in a suitable range of scientific and technical disciplines (to be accurately defined) is requested for entering the courses.

The courses should be passed at an accredited institution enabled to certify the acquisition of the specified learning outcomes. In order to be valid for the release of an ENEN certification, the institution should be member of ENEN and specifically approved by the Quality Assurance Committee of the Association for releasing the certification of the related ECVET units.

The release of the certification by ENEN will be subjected to a positive judgement on the curriculum studii of any person applying for it by a purposely constituted Group within ENEN, possibly to be identified with the “PETRUS Working Group” constituted within the Association by the PETRUS Consortium, in order to provide long term sustainability to its actions. Details on the procedures for application and on the related fees can be established in similarity with existing practices within ENEN, by opening a yearly call.

A proposal for the name of this certification could be European Expert in Radioactive Waste Geological Disposal (EE-RWGD).

As specific remark, it is necessary to explicitly note that the “European” character of the certification (included in its name) is mainly to be intended as assigned by the fact that the course contents reflect a European standard and that ENEN, as European supra-national body, is releasing the title. This is mentioned as a difference with respect to what proposed for the MSc title (see below), in which assigning the European label will require also a sufficient period to be spent abroad in an ENEN member Institution, in order to acquire the European dimension which is of great value for the personal growth of young generations during their education. The requirement to spend some part of the study period abroad seems not to be realistic for a Continuous Professional Development (CPD) title totalling 220 hours, as the one proposed in this frame.

In addition to the courses envisaged in the proposed curriculum, it is necessary to consider if a final “thesis” work can be considered applicable for a continuous professional development certification. This detail is left for appropriate consideration of the PETRUS-III Consortium.

#### **4.2 European certification in the frame of a MSc**

As an alternative to the continuous professional development certification, a quality label of European MSc in Radioactive Waste Geological Disposal (EM-RWGD) can be assigned to those individuals who have passed the requested courses in the frame of their studies for achieving the title of Master of Science in some suitable scientific and/or technical discipline. In addition to fulfil the requirements related to the coverage of the requested disciplines, similar to those applicable for the continuous professional development certification, it will be then necessary that a minimum of 300 ECTS are included in total in the university curriculum studii.

The disciplines in which the MSc is released (e.g., Engineering, Chemistry, Geology, etc.) should be accepted on a case by case basis, considering a reasonable balance between the basic matters included in the 300 ECTS and those specific of the certification.

In addition, with respect to the continuous professional development certification, whose “European” character is established on the basis of the “European standard” of the curriculum, a period to be spent “abroad” (i.e., in a Country different from the one of university enrolment) must be required. In similarity with the European Master of Science in Nuclear Engineering certification, it is suggested that this period is of at least 20 ECTS and is spent at an ENEN Member institution. Since the courses pertaining to the specialisation in Radioactive Waste Geological Disposal (RWGD) contain a total of 220 teaching hours (i.e., 22 ECTS) it may be requested that the 20 ECTS to be spent abroad contain at least 10 ECTS out of the 22 ECTS of RWGD matters.

In addition, it is appropriate that the MSc thesis work is performed in one of the matters included in the curriculum of RWGD. The workload of the thesis should be at least 15 ECTS.

The modalities for the release of this certification by ENEN are similar to those envisaged for the previously described certification for continuous professional development, with the additional condition that the specific MSc degree must be achieved before applying for the certification.

#### **4.3 Possible relations between the EM-RWGD and EMSNE**

At present, it cannot be excluded that the conditions for the release of the WM-RWGD and the EMSNE quality labels do exist simultaneously. Though the classical university programmes for a master of science in Nuclear Engineering generally include matters different from the ones specified in the curriculum studii elaborated under the PETRUS-III project, it may happen that a specific one may satisfy both requirements. In such a case, the suggested route at this stage is to release both the certifications to the same applicant, who will be then awarded the two quality labels.

#### 4.4 Defining the by-laws of the certifications

On the basis of the experience gained by ENEN in the design and the application of European Master of Science in Nuclear Engineering (EMSNE) by-laws, it is useful to suggest considering the following aspects.

- The presently proposed curriculum studii contains well defined matters and learning outcomes. Such a rigid definition is suitable to promote “harmonisation”, an idea that was abandoned quite early in the design of the EMSNE certification (see e.g., Ambrosini et al., 2013). In fact, harmonisation envisages equal curricula to be applicable throughout Europe, disregarding the specific traditions applicable at local level. “Mutual recognition”, as opposed to “harmonisation”, is anyway a more realistic concept, in which some tolerance is applied in evaluating the coverage of necessary matters, with allowance for variants that may enrich the European panorama of education and training in the field. For instance, it might happen that a specific Institution delivering the courses has stronger competences in some of the fields and weaker in others, delivering anyway a high level education or training that may be considered fully acceptable for the release of the certification.
- The above applies particularly in the academic area, also considering that different MSc disciplines (e.g., Engineering, Chemistry, Geology, etc.) have different traditions in teaching. This argument may be applicable to a lesser extent for continuous professional development, for which the spreading of specific European standards should be favoured and can be more specifically monitored.
- In connection with the possible differences between education in an academic environment and in industry or at a training Company, it can be expected that the shares of knowledge, skills and competencies obtained in the two cases may be different. Usually, teaching at universities is expected to be more knowledge-based, though basic skills should be also acquired, while in an industrial environment application skills may be favoured, though some basic knowledge must be provided. These differences should be duly taken into account while comparing the learning outcomes provided by a course for continuous professional development and by classical university courses.

## 5. Conclusions

This deliverable has proposed certifications to be released by ENEN with reference to the education curriculum proposed in the frame of the PETRUS-III project.

The present version of the deliverable contains basic suggestions to be discussed with project Partners and further elaborated on the basis of the received feedback. On the basis of this feedback, a more structured and detailed proposal will be conceived, aiming at defining the basic principles for the establishment of the ENEN certifications in the field of Radioactive Waste Geological Disposal.

## References

Walter Ambrosini and Founding Members of ENEN, 2013, Lessons learnt from 10 years of ENEN collaboration: from a knowledge to an end-user driven approach, Post FISA 2013 Workshop # 2, EC Conference FISA 2013, Vilnius, 14-17 October 2013

# By-Laws regarding the European Master of Science in Nuclear Engineering

Upon advice of the Teaching and Academic Affairs Committee, the Board of Governors of the European Nuclear Education Network Association in its meeting in Munich on March 4, 2005 has approved the following by-laws for the European Master of Science in Nuclear Engineering ENEN Certification issued by the European Nuclear Education Network Association.

## Part 1 General Provisions

Article 1 These by-laws regarding the European Master of Science in Nuclear Engineering establish the rules and requirements that must ensure that the awarding of the European Master of Science in Nuclear Engineering ENEN Certification by the European Nuclear Education Network Association proceeds smoothly and correctly, and that the European Master of Science in Nuclear Engineering ENEN Certification reflects the high quality and the objectives set out by the European Nuclear Engineering Association in Article 2 of the Statutes.

Art. 2 The following abbreviations are used:

ENEN-A	European Nuclear Education Network Association
TAAC	Teaching and Academic Affairs Committee of the ENEN-A
QAC	Quality Assurance Committee of the ENEN-A
EMSNE-EC	European Master of Science in Nuclear Engineering ENEN Certification
ECTS	European Credit Transfer System
the Chair	the Chair of the TAAC or his/her designated substitute

Art. 3 The EMSNE-EC is issued by the ENEN-A to certify that:

- a. the academic programme of an applicant leading to a Master Degree in Nuclear Engineering, or equivalent, has met all the requirements of the ENEN-A as stated in these by-laws;
- b. this Master Degree in Nuclear Engineering, or equivalent, is therefore considered by the members of the ENEN-A as the equivalent of a European Master of Science in Nuclear Engineering.

Art. 4 The EMSNE-EC is only valid together with the corresponding Diploma of Master in Nuclear Engineering, or equivalent, issued by the home institution (to be defined in Art. 6).

Art. 5 The EMSNE-EC is only awarded after a personal application.<sup>1</sup>

## Part 2 Requirements

Art. 6 The main requirement for awarding the EMSNE-EC is that the applicant has obtained a Master Degree in Nuclear Engineering, or equivalent, delivered by or in co-operation with an academic institution which is a member of the ENEN-A, or at an academic institution that is a member of a cluster of academic institutions which is a member of the ENEN-A, as described in Article 3.1 of the Statutes of the ENEN-A. This academic institution is hereafter called the home institution.<sup>2</sup>

In case the applicant has obtained a double, a multiple or a joint Master Degree in Nuclear Engineering, or equivalent, issued by more than one academic institution, the applicant must designate one of these academic institutions as the home institution, provided that this institution meets the requirements of the first paragraph of this article.<sup>3</sup>

Art. 7 The additional requirements for awarding the EMSNE-EC are:

- a. the total load of the study programme of the applicant leading to the degree of Master in Nuclear Engineering, or equivalent, is at least 300 ECTS credits at university level (besides the exception mentioned in Art. 8);<sup>4</sup>
- b. of which at least 60 ECTS credits (which may include the master thesis project) are in nuclear sciences and technology, preferably engineering, at master level;
- c. of which at least 20 ECTS credits (which may include the master thesis project) are taken at one or more academic institutions or clusters of such academic institutions, that are effective members of the ENEN-A, other than the home institution and in a different country than the home institution;<sup>5</sup>
- d. the applicant has successfully defended a nuclear engineering master thesis project;<sup>6</sup>

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<sup>1</sup> The EMSNE-EC is not awarded to academic programmes in general, but to the specific (and unique) academic programme of an applicant. The application for the EMSNE-EC must be done personally; nobody (including the academic institution issuing the Master Degree in Nuclear Engineering) can apply for the EMSNE on behalf of an applicant.

<sup>2</sup> This requirement is the basis for awarding a Diploma Supplement to a Master degree already obtained.

<sup>3</sup> In the case of consortia awarding degrees, like Erasmus Mundus Consortia.

<sup>4</sup> This was one of the basic requirements of the EMSNE-EC as set out in the ENEN project. The 300 ECTS credits at university level should guarantee that the student has a genuine understanding of the basic sciences underlying nuclear engineering.

<sup>5</sup> At least the equivalent of 20 ECTS of nuclear engineering courses, and or a Master thesis project, must be taken abroad, which was one of the basic ideas of the EMSNE. What's more it must be taken at a fellow ENEN member institution, in order to promote the mobility between ENEN member institutions, to have a better view of the content and quality of these courses followed abroad, to limit automatically the international exchange to Europe, since it is an European master.

<sup>6</sup> The master thesis is an important part of the Master in Nuclear Engineering being assessed. An option is, like the 20 ECTS abroad, to demand that it happened under the supervision of a faculty member of an academic institution

e. the courses referred to in Art. 7.b cover at least the following fields of study:<sup>7</sup>

- Nuclear Power Plant Technology & Reactor Engineering,
- Reactor Physics,
- Nuclear Thermal Hydraulics,
- Safety and Reliability of Nuclear Facilities,
- Reactor Engineering Materials,
- Radiology and Radiation Protection,
- Nuclear Fuel Cycle and applied radiochemistry.

f. laboratory work on some of the above fields of study.<sup>8</sup>

Art. 8 Exceptions to the minimum total academic course load of 300 ECTS credits as described in Art. 7a can be made only if the TAAC is of the motivated opinion that the academic programme followed by the candidate is equivalent to a 300 ECTS credits university programme representative for the academic ENEN-A members.<sup>9</sup>

### Part 3 Application

Art. 9 The TAAC decides on the form and content of the application form the applicant has to submit.

Art. 10 The Secretary-General makes the application forms available to applicants.

Art. 11 The applicant has to prove payment of an application fee. The application fee for the EMSNE-EC is fixed by the Board of Governors.<sup>10</sup>

Art. 12 The application form must be co-signed by a faculty member of the home-institution.

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or a cluster of such academic institutions, that is an effective members of the ENEN-A. In most cases this will be granted anyway, either at the home institution or at a fellow ENEN institution to be eligible for the 20 ECTS abroad.

<sup>7</sup> It is not possible to give a complete description of these fields of study in these by-laws. A more elaborated description of this field of study can be found in the guidelines the TAAC should use to determine if they have been treated in a satisfactory way.

<sup>8</sup> Nuclear Fuel Cycle was previously not explicitly mentioned as a field of study, neither in the former proposals, nor in the end report of the European Nuclear Engineering Network, but it was assumed to be a part of Reactor Engineering Materials. It seems more appropriate and clear to mention it explicitly, though, certainly, since the nuclear fuel cycle, viz. the waste management, is a major discussion point in the social acceptance of nuclear energy. An other option is Nuclear Fuel Cycle and Radiochemistry.

<sup>9</sup> The exception to this rule is provided to assure that, given the broad spectrum of university programmes existing in the different European countries, some of which lead to a Master in Nuclear Engineering with a study load of less than 300 ECTS credits at university level; that even those study programmes can be eligible for the EMSNE on the condition that they are considered to be equivalent to the 300 ECTS programmes and also guarantee that the student has a genuine understanding of the basics sciences underlying nuclear engineering. This has to be checked and motivated by the TAAC.

No exceptions, neither to the 60ECTS in nuclear engineering, or to the 20ECTS abroad are possible, since both requirements are the core of the European Master in Nuclear Engineering.

<sup>10</sup> The Quality Assurance Committee (Helsinki January 24, 2005) was of the opinion that an application fee should be asked, to cover the administrative costs and to make sure that the EMSNE is not considered as valueless, because it is for free.

- Art. 13 Completed application forms are submitted to the Secretary-General of the ENEN-A, who checks whether the application form is complete and the application fee has been paid, and, if so, distributes a copy of the submitted application form to each member of the TAAC, one month before the next TAAC meeting .
- Art. 14 The time span between receiving the degree of Master in Nuclear Engineering, or equivalent, at the home institution and the application for the EMSNE-EC should be not more than five years.<sup>11</sup>
- Art. 15 The applicant can withdraw the application by a letter to the Secretary-General; the application fee will not be refunded, unless the provisions of these by-laws regarding the maximum term at which the TAAC must come to a decision were not observed.

#### **Part 4 Deliberation**

- Art. 16 The decision whether to award the EMSNE-EC to an applicant, or not, is autonomously made by the TAAC in accordance with the rules and requirements set out by these by-laws.<sup>12</sup> The decision is transformed into a recommendation to the ENEN-A Board, which is forwarded to the ENEN Secretary General (see further Art 26).
- Art. 17 The TAAC can develop additional guidelines, in accordance with these by-laws, on how to assess whether an applicant has fulfilled all the requirements set by these by-laws.<sup>13</sup> These additional guidelines are to be approved by the board.
- Art. 18 In the event that a member of the TAAC is a member of staff of the academic institution that has (co-)issued the Master Degree in Nuclear Engineering, or equivalent, to the applicant; this member of the TAAC must request that the other members of the TAAC appoint a substitute member. This substitute member is to be considered as a member of the TAAC for this application.<sup>14</sup>  
The same applies, in the event that an applicant and a member of the TAAC are related, by blood or marriage up to and including the third degree.
- Art. 19 The decision to award the Diploma Supplement to an applicant is made on an individual basis, and after deliberation and assessment of the submitted application form.<sup>15</sup>
- Art. 20 The TAAC acts collectively.<sup>16</sup>  
All decisions are made by a simple majority (in favour versus against: blank votes or

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<sup>11</sup> To avoid that applications are submitted to the ENEN-A, way to long after the graduation of the applicant, to determine if the application has fulfilled all the necessary requirements. Five years really seems the maximum period.

<sup>12</sup> It is the TAAC, whose members are appointed by the Board of Governors, which decides whether to award the EMSNE-EC. The TAAC acts in this case as a kind of examination board.

<sup>13</sup> These guidelines can help the members of the TAAC to assess applications: when can a course be considered to have been followed abroad?, how to assess whether “of university level”?, how to count ECTS credits, etc. In addition, these guidelines will guarantee consistency in the decisions of the TAAC.

<sup>14</sup> To further increase the impartial quality content of the EMSNE-EC, no member of the TAAC, who is too closely involved with the applicant or the applicant's study programme, can be part of the decision to grant the EMSNE-EC.

<sup>15</sup> There is no generic approval of a certain study programme or a certain degree, of which all people accomplishing it, are automatically awarded the EMSNE-EC. The individual study programme of each applicant is assessed.

<sup>16</sup> The members of the TAAC can differ in view during the deliberations, after the voting the decision is that of the TAAC as a whole.

abstentions are not counted) of the votes cast, provided that a majority of the members of the TAAC cast their vote (including blank votes and abstentions). In the case of a tie vote, the Chair has the deciding vote.<sup>17</sup>

The awarding of the EMSNE-EC itself, however, is made by a two-third affirmative vote of the members of the TAAC . Blank votes and abstentions are considered as negative votes.<sup>18</sup>

No proxies are allowed. Upon request by a member of the TAAC, a secret vote is held.

- Art. 21 The deliberation and casting of votes by the TAAC can be done in any other way the TAAC finds appropriate, however written confirmation of the vote must be sent to the Chair.<sup>19</sup>
- Art. 22 The Chair of the TAAC sets the date for the decision on an application. The TAAC must take a decision not later than seven<sup>20</sup> months after the Secretary-General has received the application (as per postmark).<sup>21</sup>
- Art. 23 Before making a decision on an application, the TAAC can request that the applicant and/or the co-signing faculty member, as described in Art. 12, provide the TAAC with additional information regarding the application. The request is sent out by the Secretary-General. The term set-out by Art. 22, is suspended until the requested information is provided to the Secretary-General by the applicant and/or the co-signing faculty member.
- Art. 24 The decision by the TAAC whether or not to award the EMSNE-EC is final. No appeal is possible. In the case of a negative decision, the applicant is allowed to submit a new application, as described in these by-laws.<sup>22</sup>
- Art. 25 The members of the TAAC and any other person present at the deliberation proceedings are bound to secrecy regarding deliberation and voting.
- Art. 26 The minutes of the deliberation are drafted by the Chair, and consist for each applicant of:<sup>23</sup>
- a. the TAAC members who participated to the deliberation and voting,

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<sup>17</sup> A classical voting rule to allow the functioning of the TAAC, e.g. to reschedule a decision, or to request further information from the applicant.

<sup>18</sup> A more severe voting rule to avoid that the EMSNE-EC is awarded by the TAAC, when a Committee of 5 persons of which 3 cast their vote decides to award the EMSNE-EC with a majority of the double vote of the Chair, one vote against and one abstention.

<sup>19</sup> To accelerate the decision, it is interesting to give the TAAC the liberty to decide how to deliberate about an application.

<sup>20</sup> A maximum term of five months, means that the TAAC must have at least three decision moments (not necessarily convene, see the preceding Article) a year. A maximum term of seven months means that the TAAC must have at least two decision moments a year.

<sup>21</sup> The members of the TAAC must have sufficient time to study the application. The decision should not be postponed indefinitely, so a maximum term is included.

<sup>22</sup> No appeal is possible. An applicant can, however, resubmit an application, e.g. after having pursued a master degree which was not considered as a genuine master in nuclear engineering , the applicant can decide to study for an additional genuine master degree and resubmit his/her file afterwards.

<sup>23</sup> To have the necessary documentation to 1) let the Secretary-General notify the applicants of the outcome of the decision of the TAAC and 2) to report to the Board of Governors, concerning the application procedure and the participation of the different TAAC members to the vote.

- b. the overall decision,
- c. in the case of a positive decision to award the EMSNE-EC and if applicable, the motivation for using Art. 8 of these by-laws,
- d. in the case of a negative decision to award the EMSNE-EC, the requirements for the EMSNE-EC set out by these by-laws which the applicant did not fulfil,
- e. the submitted application file.

Within two weeks of the decision, the Chair sends the minutes and recommendations to the Secretary-General. The Secretary General transmits the minutes and recommendations to the Members of the Board for (a) verifying that the applications have been handled and treated according to the current bylaws and (b) for endorsing and implementing the recommendations made by TAAC through the Secretary General. The Secretary General notifies the applicants and archives the minutes. In the exceptional case that the Board would not follow the recommendations made by TAAC, the Secretary General takes all actions as necessary to mediate and resolve the problem.

## **Part 5 Notification**

- Art. 27 Within four weeks of the decision of the TAAC, the Secretary-General provides each applicant and the co-signing faculty member of the home institution with a written notification of the decision of the TAAC regarding the application.
- Art. 28 In the case of a negative decision concerning awarding the EMSNE-EC, the Secretary-General lists in this written notification the requirements, mentioned in the minutes of the deliberation as described in Art. 26d, which the applicant did not fulfil.<sup>24</sup>
- Art. 29 In the case of a positive decision concerning awarding the EMSNE-EC, the Secretary-General issues the EMSNS-DS, according to the rules set out in these by-laws, and presents it to the applicant.

## **Part 6 Diploma Supplement**

- Art. 30 The EMSNE-EC carries the following text.

On behalf of the European Nuclear Education Network Association, we acknowledge that the academic programme of [given name and family name of the applicant] born on [date of birth (month day, year) of the applicant] , [place of birth (city and country) of the applicant], leading to the following degrees and certificates

[legal name of the Master Degree]

[ any additional degrees and certificates being part of the nuclear education program]

fulfils all the requirements set by the European Nuclear Education Network Association and is therefore considered by the member institutions to qualify as the equivalent of European Master of Science in Nuclear Engineering.

<sup>24</sup> The applicant has the right to know why the EMSNE-EC was not granted. This information provided remains very concise. No detailed voting record is presented and the results are not open for discussion.

- Art. 31 The EMSNE-EC mentions the city, country and date of issue.
- Art. 32 The EMSNE-EC is signed by the Chair, and the President or Vice-President of the ENEN-A. Their academic title, full name and function within the ENEN-A are mentioned.<sup>25</sup>
- Art. 33 The EMSNE-EC carries the official logo and English name, written in full, of the European Nuclear Education Network Association.
- Art. 34 The EMSNE-EC mentions the full legal names of all the institutions that are an ENEN-A member at the time of issuing the EMSNE-EC. The names of the institutions are alphabetically ranked according to the municipality of their legal seat. First the effective members are mentioned, then the associated members.  
For consortia which are member of the ENEN-A, the municipality of the first ranked consortium member institution is used, when the members of the consortium are ranked according to the method above.
- Art. 35 The EMSNE-EC mentions the address of the registered office of the ENEN-A.
- Art. 36 The EMSNE-EC clearly states: “ENEN Certification” and “This document is only valid together with the corresponding Diploma issued by the university of registration.”<sup>26</sup>

## **Part 7 Reporting and Quality Assurance**

- Art. 37 The TAAC reports annually to the Board of Governors about the activities of the TAAC regarding the awarding EMSNE-EC.<sup>27</sup> This report contains<sup>28</sup>:
- a. a list of the application files and the corresponding decisions,
  - b. total deliberation and voting participation of each TAAC member,
  - c. an overview of the requirements for the EMSNE-EC which the rejected applicants did not fulfil,
  - d. the use of Art. 8 of these by-laws,
  - e. an overview of the guidelines mentioned of Art. 17 used to assess the requirements listed in these by-laws,
  - f. a short self-assessment of the activities of the TAAC regarding the awarding of the EMSNE-EC,

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<sup>25</sup> The Quality Assurance Committee (Helsinki January 24, 2005) was of the opinion that the Diploma Supplement should be signed by the Chair of the TAAC and the President of the ENEN-A, to avoid short-circuits and to reflect the actual situation that the TAAC takes the decision on behalf of the board.

<sup>26</sup> What with academic institutions who are not labelled universities in the strict sense? Alternatives:  
1) “This document is only valid together with the corresponding Diploma issued by the academic institution of registration.”

2) “This document is only valid together with the Diploma of [legal name of the of Master Degree in Nuclear Engineering, or equivalent, obtained at the applicant’s home institution] issued by the [full legal name of the home institution].”

<sup>27</sup> The Board of Governors delegates the responsibility for awarding of the EMSNE-EC to the TAAC. The Board of Governors has the right and duty to be kept informed about the activities of the TAAC regarding the EMSNE-EC.

<sup>28</sup> The report resumes to a large extent the information available in the minutes of the TAAC. This information is represented in a general/anonymous, without personal details about the applications.

- g. questions and recommendations to the Board of Governors regarding the awarding of the EMSNE-EC.

Art. 38 The Board of Governors discusses this report and responds to the TAAC.

Art. 39 The TAAC can ask the Quality Assurance Committee for assistance in developing the guidelines of Art. 8 and for assessing the functioning of the TAAC regarding the awarding of the EMSNE-EC, as described in these by-laws.<sup>29</sup>

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<sup>29</sup> The QAC does not assess individual applications, but it is the main partner in assessing the general rules for awarding the EMSNE-EC.