

**Evaluation Report for the Certification of
the Spectrum Management Training Programme
(SMTP)
offered by the
International Telecommunication Union**



1st Meeting of the ZEvA Commission, February 27, 2018

4.03

Expert Panel

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/ Final Vote of the Expert Panel and Decision of the ZEvA Commission

1 Decision of the ZEvA Commission

I. Final Vote of the Expert Panel and Decision of the ZEvA Commission

1. Decision of the ZEvA Commission

The ZEvA Commission follows the experts' report and recommendations and takes note of ITU's response.

In due consideration of the requirements of the European Standards and Guidelines for Quality Assurance in Higher Education (ESG), the ECTS Users' Guide and the European Qualifications Framework for Lifelong Learning,

the Commission awards the ZEvA quality label to the Spectrum Management Training Programme (SMTP) as offered by the International Telecommunication Union.

The quality label certifies that the modules of the SMTP are equivalent in level and content to educational units in Master's programmes at higher education institutions, and that the ECTS key features are correctly implemented.

The certification is valid for a period of five years.

2. Summary of the Experts' Findings and Final Vote of the Panel

The experts conclude that the International Telecommunication Union has created a high-level training programme which is very well tailored to the needs and demands of the global telecommunication sector. Learners at all programme levels will benefit strongly from the in-depth knowledge and skills imparted by the SMTP. The modular structure of the programme and the blended learning approach allow for a high degree of flexibility.

The ECTS has been implemented correctly, and all modules are clearly equivalent to Master's modules at universities (level 7 of the EQF). The programme (or its parts) may provide a solid foundation for a study programme at a university, but a stronger theoretical basis and additional research elements would be required to justify the awarding of a Master's degree.

The experts would like to give the following recommendations for further development:

- The experts recommend providing clear guidelines to their partners about the degree of flexibility in delivering the course contents. Lecturers should always be able to differentiate between issues of central importance and aspects that may be disregarded or changed.
- ITU should remain in close touch with its partner institutions in order to monitor the overall development of the programme and to identify possible problems as early as possible. In particular, adequate measures for the monitoring of student workload should be taken by the partners, and the results should be communicated to ITU on a regular basis.
- Multiple choice exams should never account for more than 40% of the overall module grade. Wherever possible, alternatives to multiple choice questions should be chosen.
- The experts recommend awarding 10 instead of 5 ECTS credit points for the Obligatory Module OM3.

2.1 Final Vote of the Expert Panel

The expert panel recommends to the ZEvA Commission to award the ZEvA Quality Label to the Spectrum Management Training Programme offered by the International Telecommunication Union.

The quality label certifies that the modules of the programme are equivalent in level and content to educational units in Master's programmes at higher education institutions, and that the ECTS key features are correctly implemented.

The label does not imply that the programme as a whole is equivalent to a Master's programme. In particular, the research element and the theoretical basis of the programme would have to be strengthened to justify the award of a Master's degree.

The certification of the training programme is recommended for a period of **five** years.

II. Evaluation Report of the Expert Panel

Purpose and Design of the Review Procedure

In the spring of 2017, the International Telecommunication Union (ITU) based in Geneva, Switzerland, commissioned the Central Evaluation and Accreditation Agency Hanover (ZEvA) with an external assessment of its newly developed “Spectrum Management Training Programme” (hereinafter: SMTP).

The main goal of the review was to measure the programme against a set of standards and frameworks for the European Higher Education Area in order to assess its equivalence to academic study programmes in the field of Spectrum Management.

For the purpose of the assessment, ZEvA assembled a panel of three experts in the field of Spectrum Management (two experts from academia and one representative of the industry).

The review procedure involved a desktop validation of a written self-report submitted by ITU, as well as a discussion round with four representatives of ITU in Hanover on December 5, 2017. All participants on the side of the ITU had been closely involved in developing and launching the SMTP.

The assessment results included in this report are based both on the written information provided by ITU and the outcomes of the talks in Hanover.

In detail, the experts assessed whether

- the individual parts/modules of the programme are equivalent to educational units in Master’s programmes and can therefore be recognized by higher education institutions,
- the ECTS key features have been implemented correctly,
- the intended learning outcomes of the programme and its components are transparent, plausible and in line with the level and profile of the programme,
- the intended learning outcomes can be achieved within the specified time frame (constructive alignment of intended outcomes, contents, and methods of teaching and assessment),
- the qualifications provided by the SMTP as a whole are equivalent to Level 7 in the European Qualifications Framework for Lifelong Learning (EQR 7), or to Master’s programmes at higher education institutions.

The following key documents provided the framework of assessment and the basis of the procedural design:

- European Qualifications Framework for Lifelong Learning (2008),
- Framework of Qualifications for the European Higher Education Area (2005),
- ECTS Users’ Guide (2015),
- European Standards and Guidelines for Quality Assurance in the European Higher Education Area (2015).

1. Goals and Design of the Programme

General Background and Target Group

The International Telecommunication Union is the United Nations specialized agency for information and communication technologies. Headquartered in Geneva, Switzerland, ITU has twelve regional and area offices around the world, almost 200 member countries and about 800 member institutions. The organization's activities can be divided into three major areas or "sectors": Radiocommunications, Standardization and Development.

The SMTP was developed by the Human Capacity Building Division (HCB) of the ITU, under the umbrella of the ITU Academy which is the central framework for all capacity building activities in the agency. HCB is the division that is responsible for developing, coordinating and managing ITU training services developed under the framework of the ITU Academy. Each year ITU offers a large spectrum of training courses and services directed at various target audiences, ranging from policy makers and diplomats to business managers and practitioners.

In delivering the training programmes, ITU works together with numerous partners around the globe. These may be private companies or training institutes, but also academic institutions. In particular, ITU has set up a global network of so-called "Centers of Excellence" which serve as regional hubs for professional development and capacity building. Again, these may be academic or non-academic institutions.

The Spectrum Management Training Programme is the first of a series of similar programmes that are currently being developed under the ITU Academy. All of these programmes are primarily directed at professionals in the field of Telecommunications who require highly specialized knowledge and skills that they can acquire or enhance on the job only partly or in some cases not at all. The programmes are designed in such a way that participants can keep working part-time while taking the course. This is achieved by means of a modular programme structure which enables participants to study at their own pace, and through a blended learning approach requiring relatively little face-to-face teaching.

In its official report on the SMTP (dated December 2014), ITU describes the target audience of the programme as follows:

The SMTP course would be designed for anyone wishing to enhance their professional knowledge while working in the field of SM, for example in a national regulatory authority or a company operating in wireless communications. The SMTP would be oriented towards the broadening of skills in the complex field of radio SM; it could thus be taken by any professional who has previously graduated with a first-level university degree (Bachelor of Science). This being the case, students entering the SMTP may be from different institutional levels, from technical to managerial, and from different backgrounds (engineering, legal, economic etc.).

The SMTP was developed in response to high demand for spectrum management (SM) experts on the side of the ITU institutions and member states. An internal task group including representatives of all three main sectors of ITU was set up to oversee the development pro-

cess, which involved a large number of SM experts from academia, industry and regulatory authorities. The experts developed the concept, structure and contents of the programme under the supervision of the central programme coordinator, or acted as peers during the final internal review of the teaching materials. Before finalization, each module was reviewed by at least two independent experts.

So far, ITU has closed cooperation agreements with two external partners for the delivery of the SMTP: the Czech Technical University in Prague and the African Advanced Level Telecommunications Institute (AFRALTI) in Nairobi, Kenya. Both institutions are Centers of Excellence within the above mentioned network and have recently enrolled the first students into the programme. However, none of the institutions yet offers the full spectrum of modules, but only a limited selection (cf. description of the modular structure below). In the long run, ITU is aiming at a maximum of about 10 partner universities to function as providers of the complete set of modules of the SMTP towards award of a Master's degree.

Programme Structure and Implementation of ECTS

The SMTP comprises a total of five core modules (obligatory modules) and a pool of ten elective modules. The programme is divided into two main stages or levels (basic and advanced level). In order to receive the basic level certificate, three obligatory modules and one out of six elective modules must be completed. For the advanced level certificate, there are two obligatory modules and two electives with either a technical or a legal focus, depending on the student's chosen specialization.

Students may also choose to enroll for only one individual module without aiming at a level certificate. In case the programme is offered by a higher education institution, it is meant to provide the basis for a formal academic qualification (Master of Science) in combination with a Master's thesis (to be supervised by the Higher Education Institution) and possible additional modules, depending on national and institutional requirements.

For each of the modules, a total of 5 ECTS credit points is awarded, with the exception of the obligatory module in Spectrum Engineering Fundamentals, which counts for 7 credits. An average student workload of 25 hours is assumed for each credit point. Participants must pass an intermediate and/or a final module assessment in order to be awarded credit points for the educational unit and to obtain the intended certification.

A detailed syllabus card was developed for each module which describes the intended learning outcomes and contents of the course, the credit points awarded as well as the methods of teaching and student assessment applied. All in all, the syllabus cards are strongly modeled on typical course handbooks at universities as recommended by the ECTS Users' Guide.

In total, the SMTP comprises at least 42 ECTS if only the minimum number of electives is chosen. Participants aiming for a Master's degree, however, will be required to collect between 60 and 90 ECTS, which may be achieved by writing a final thesis and/or taking additional classes or modules.

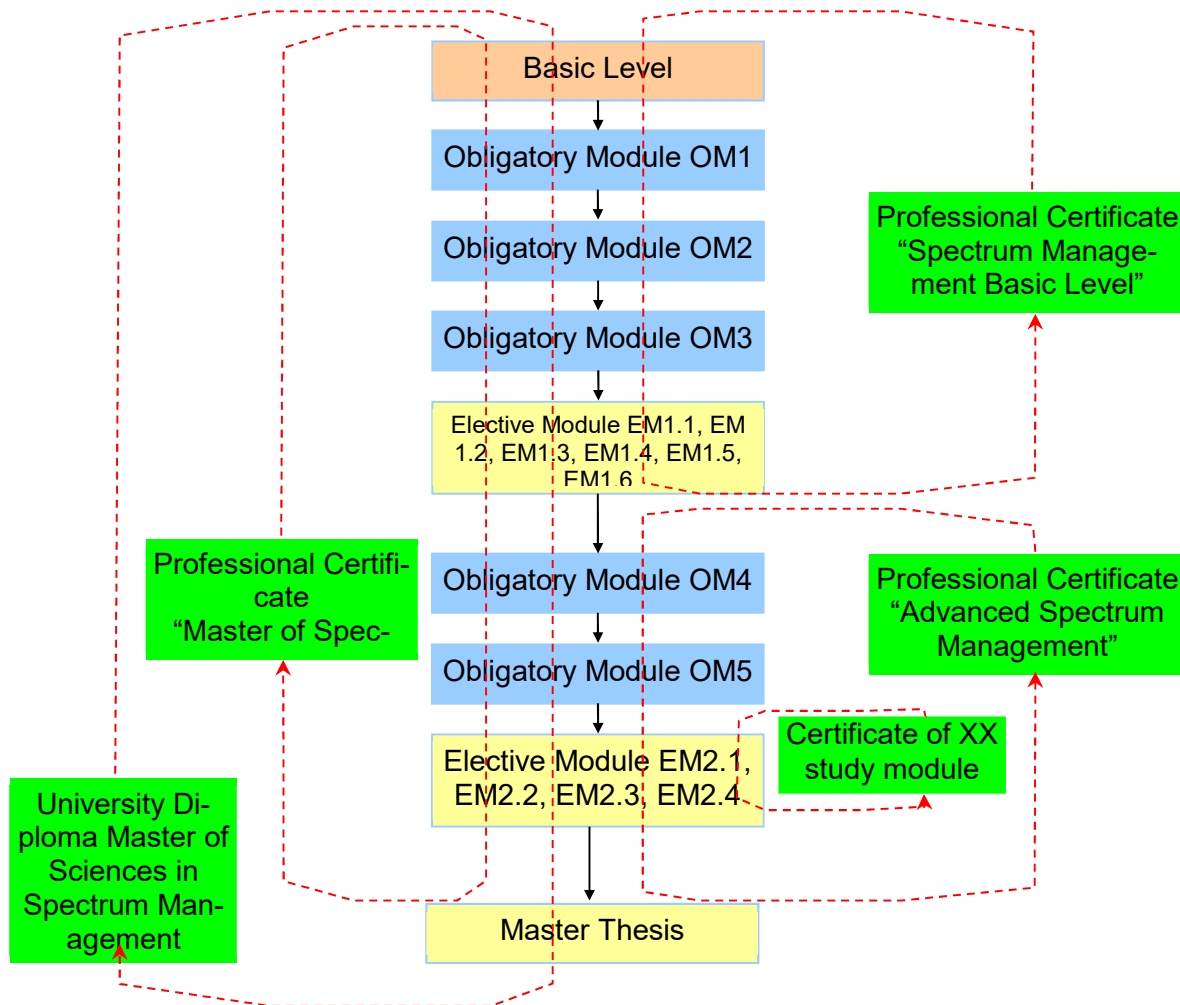


Figure 1. Possible derivative options for university or professional, full or partial certification levels

Intended Learning Outcomes and Qualification Levels

In order to study the Basic Level modules, students should ideally have a Bachelor’s degree or an equivalent qualification in a technical, economic or legal discipline relevant to the field of Spectrum Management, although this is not a formal prerequisite for enrolment. Long-term professional experience is not required either.

For admission to the Advanced Level, participants must have completed the Basic Level successfully or, alternatively, have at least one year of practical professional experience in Spectrum Management. For those students who wish to proceed all the way to a Master’s degree, a Bachelor’s degree will be a prerequisite for graduation.

In its self-report, ITU has provided the following overview of the intended learning outcomes for each programme level:

SMTP Completion Level	Knowledge	Skills	Competences
Basic Level	Highly specialised knowledge in the field of Spectrum Management, as the basis for successful professional activity.	Specialised problem-solving skills required in a workplace at spectrum management specialist (engineer) level.	Carry out tasks in the field of Spectrum Management independently at basic professional level, such as tasks related to assignment, coordination and monitoring of radio frequencies for various radio-communication services and systems.
Advanced Level	Highly specialised knowledge, some of which is at the forefront of knowledge in the field of Spectrum Management, as the basis for original thinking and successful professional activity. Critical awareness of knowledge issues in the Spectrum Management field and at the interface between different fields, such as Wireless Technologies, Law and Economics.	Specialised problem-solving skills required in a workplace at spectrum management expert level. Ability to perform innovation in the field of Spectrum Management in order to develop new knowledge and organizational procedures and to integrate knowledge from different fields.	Carry out tasks in the field of Spectrum Management independently at advanced level, such as tasks related to national and international planning and allocation of spectrum for new wireless services and applications, national spectrum assignments/awards under liberalised market-oriented conditions. Manage and transform work contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.
Master of Sciences Diploma Level	Highly specialised knowledge, some of which is at the forefront of knowledge in the field of Spectrum Management, as the basis for original thinking, successful professional activity and/or research. Critical awareness of knowledge issues in the Spectrum Management field and at the interface between different fields, such as Wireless Technologies, Law and Economics.	Specialised problem-solving skills required in a workplace or research institution at spectrum management expert level. Ability to perform research and/or innovation in the field of Spectrum Management in order to develop new knowledge and organizational procedures and to integrate knowledge from different fields.	Carry out tasks in the field of Spectrum Management independently at advanced level, such as tasks related to national and international planning and allocation of spectrum for new wireless services and applications, national spectrum assignments/awards under liberalised market-oriented conditions. Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.

As illustrated in the table, the ILOs at all programme levels clearly refer to Level 7 of the European Qualifications Framework, i.e. participants are supposed to continuously extend and sharpen their skills and knowledge in progressing through the programme, until they have

acquired the full skill set expected from Master's graduates upon completion of the Advanced Level. However, acquiring advanced research competence is an explicit goal only for those students who wish to proceed all the way to the Master's degree.

Regardless of that, the SMTP is of course also open for professionals who already hold a Master's degree and wish to study selected modules as part of their personal career development.

Contents

In each of the SMTP modules, the teaching material mainly consists of a compilation of slides, all of which were submitted to the expert panel. Per module, an average of ca. 100 slides has been compiled. The module authors commissioned by ITU were also asked to generate a few sample test questions and tasks for student assessment. These were also submitted along with the slides.

It was made clear during the talks in Hanover that the slides are meant to assure a minimum standard of teaching, but that lecturers are of course allowed a certain degree of flexibility as regards contents, style and methods of delivery and assessment. Some diversion from the original material is accepted (and anticipated), as long as the core contents are taught as laid out in the slides. For instance, individual slides may be dropped if teachers find them redundant or overloaded. Also, the programme may take on a certain national or regional "flavor", depending on where it is offered.

The three obligatory modules at Basic Level provide an introduction to the fundamentals of Spectrum Management and Engineering. This includes both technical and legal/regulatory aspects. Most of the six elective modules focus on selected areas of application, as e.g. satellite systems, aeronautical or maritime systems.

At the Advanced Level, the two compulsory modules are about the main economic principles and market mechanisms of Spectrum Management (OM 4), as well as strategic planning and policy development in the field of SM (OM 5). Depending on the students' preferences, two additional elective modules are dedicated to special legal or technical aspects of SM.

Generally speaking, all modules focus very strongly on practical application. As stressed by the ITU representatives present during the interviews, it was a conscious strategic decision not to include any research elements into the SMTP, as the programme is mainly aimed at professionals seeking to apply the acquired knowledge and skills in their own work settings. Students opting for a career in science and research will have to rely on the input and guidance provided by the higher education institution offering the programme in order to develop the required skills.

Methods of Teaching and Student Assessment

For each module, a duration of about 4-5 weeks and an average weekly student workload of 30 hours are assumed.

The SMTP is based on a blended learning approach, combining in-class teaching with self-directed distance learning via an online platform. Students may use the ITU learning management system (based on Moodle) or alternative tools provided by the partner institutions.

The percentage of classroom teaching varies, depending on the module. Whereas the obligatory modules are supposed to be classroom-driven to a large extent, the electives rely primarily on distance learning, complemented by webinars, excursions and/or regular course-work assignments. All obligatory modules are expected to involve at least one week of in-class instruction/lectures to provide the necessary input, whereas in the electives, attendance of seminars and workshops may not always be part of the schedule, even though short internships, lab work or practical exercises may be a requirement.

Formal assessment may take on different forms, as e.g. reports, essays or written examinations. So far, the most popular type of assessment seem to be multiple choice questionnaires, as these can be conveniently applied in e-learning settings. In every module, combinations of different forms of assessment are possible: for example, continuous intermediate assignments or practical exercises may be complemented by a final module exam.

Experts' Assessment

The experts commend ITU on its strategic decision to develop the Spectrum Management Training Programme. Even though the programme addresses a relatively limited audience, there is a global demand for the highly specialized expertise it provides. To the experts' knowledge, there are no comparable programmes on the complex and interdisciplinary field of SM. Hence, the SMTP fills an important niche in the education market. The two-level modular structure of the programme allows for a maximum of flexibility and further enlarges the potential target audience of the SMTP.

Based on the information provided, the experts can confirm that all modules of the SMTP correspond to Level 7 in the European Qualifications Framework for Lifelong Learning, both in terms of intended learning outcomes and in terms of content. Higher education institutions could therefore recognize the modules as equivalent to Master's modules or integrate them into their own Master's programmes without a substantial loss in quality. The syllabus cards and teaching materials provide a solid basis for recognition.

The experts would like to stress, however, that from their point of view, the SMTP as a whole does not lead to a qualification equivalent to a Master's degree at universities, even if a final thesis is added at the end. In order to qualify students to proceed to the Ph.D. level, a stronger theoretical basis (especially as far as mathematical concepts are concerned) has to be provided, and the research element of the programme would have to be strengthened. At present, the programme is indeed demanding in its requirements, but very strongly focused on the practical application of special knowledge and skills. Higher education institutions wishing to implement the full set of modules would have to contribute additional theoretical aspects and impart scientific research skills in order to meet the standards stipulated in the relevant European qualifications frameworks.

The ECTS key features have been fully implemented in the SMTP. Credit points are allocat-

ed to each educational unit based on the estimated workload students must spend to achieve the intended learning outcomes of the module. This includes in-class teaching, self-study times and time required for examinations. The assumption of 25 working hours per credit point is in line with the recommendations of the ECTS Users' Guide. Credit points are only awarded upon successful assessment of the achieved learning outcomes.

In the self-report it is mentioned that the full programme including a Master's thesis – which equals a minimum workload of 60 ECTS – could be absolved within one year while maintaining a part-time working position at the same time. Based on their experience and their knowledge of similar “professional” Master's programmes offered by universities, the experts do not regard this as realistic. When advertising the programme, ITU should therefore refrain from specifying the total duration of the programme (which is very likely to vary anyway, depending on the partner institution and its regulations).

In the majority of the modules, the experts regard the amount of credit points awarded as plausible. One exception is the Obligatory Module 3: for a 5-credit module, the experts find the theoretical input too high, and there is also a clear overshoot of slides attached to that module. Therefore, the experts recommend awarding 10 ECTS instead of 5 in this case, or reducing the teaching content substantially.

As laid out in the self-report, all modules have been designed by renowned experts in the field of SM, who, however, were not necessarily experienced teachers. Even though the experts evaluate the teaching and learning material for most of the modules as adequate, some units appear to be overloaded to a certain extent. During the talks in Hanover, the ITU representatives stressed that teachers were free to drop some of the contents suggested on the slides as they considered appropriate. Considering that the SMTP is meant to be offered by numerous partners around the globe, ITU should take all efforts to ensure that the core contents of the modules always remain part of the curriculum, no matter where and by whom they are taught. Hence, the experts recommend providing clear guidelines to their partners about the degree of flexibility in delivering the course contents. Teachers should always be able to differentiate between issues of central importance and aspects that may be disregarded or changed.

By and large, the experts see a plausible alignment of intended learning outcomes, contents and methods of teaching and assessment across the programme. The combination of different types of assessment in each module is also appreciated. Nevertheless, it should be ensured that multiple choice exams never account for more than 40% of the overall module grade. Wherever possible, alternatives to multiple choice questions should be chosen.

2. Implementation and Management of the Programme

As mentioned above, ITU intends to offer the SMTP in conjunction with partner institutions from its global network (“Centers of Excellence”). Institutions outside the higher education sector can offer the full set of modules and award the two level certificates, but without leading students all the way to a Master’s degree.

ITU closes cooperation agreements with all partners concerning the implementation of the programme. A sample template was submitted to the experts along with the self-report. The agreements regulate the general roles and responsibilities of all parties involved, including questions of intellectual property rights and financial provisions.

Based on the contractual agreement, the partner institutions are licensed to use the SMTP training materials free of charge and in return transfer a certain percentage of the training fees back to ITU. The partners also have to provide the infrastructure, equipment and resources required for executing the programme (or individual modules).

This also includes human resources, i.e. qualified teachers. In case the partner institution is from the higher education sector, ITU puts unconditional trust in the quality of its teaching staff. All other partners have to obtain the approval of ITU regarding the teachers they intend to appoint prior to starting the programme. In addition, ITU is currently building up its own pool of experts that partners can draw upon if necessary.

ITU has taken great care to ensure a high quality of the SMTP “ex ante”: as outlined above, each module has been reviewed twice by independent experts in the field, and pilot courses were offered before the official start of the programme.

According to ITU’s self-report, the responsibility for the “ex post” quality assurance of the SMTP lies primarily with the partner institutions. This applies, for instance, to monitoring and evaluation activities like course evaluation or other types of surveys. In spite of that, it became apparent during the talks in Hanover that ITU is indeed taking concrete measures to keep an overview of the programme and its quality: for instance, a regular review and update of all modules by the responsible ITU department is planned. A Steering Committee in which ITU and all partners are represented will also be set up. As a general rule, the initiative for updates and changes to the programme may come from ITU, from the authors of the modules or from the partner institutions.

Experts’ Assessment

ITU has taken great care to design an up-to-date, high-quality training programme that lives up to the quality standards of leading universities. The experts have no doubt that in terms of content and imparted qualifications, the SMTP will fulfil this expectation.

As for practical implementation, the experts advise ITU to remain in close touch with its partner institutions in order to monitor the overall development of the programme and to identify possible problems as early as possible. In particular, adequate measures for the monitoring

of student workload should be taken by the partners, and the results should be communicated to ITU on a regular basis. At present, the allocation of the same number of credits to virtually all modules does not appear fully plausible to the experts, especially as the volume of teaching material appears to cover an extremely wide range. Student surveys conducted by all partners could help to find out whether the calculated workload is accurate, or whether changes will be necessary.

In view of the fact that several training programmes modelled on the SMTP are already planned, ITU should also consider founding a higher education institution entitled to award university degrees.

III. Appendix

1. Response of the International Telecommunication Union to the Expert Report

ITU thanks ZEvA and its team of experts for a detailed and clear report as well as comprehensive recommendations made towards the improvement of the SMTP. The ITU fully agrees with the analysis and conclusions of the evaluation report, and commits to work on further improving the SMTP course and its delivery methods along suggested directions.

Comments on recommendations

ITU commits to consider recommendations made by the ZEvA team of experts and would like to specifically note the following:

The recommendation to provide clear guidance to course delivery partners (and ultimately to lecturers) on the degree of allowed flexibility: the ITU will work with SMTP development team and material authors to provide initial guidance on this matter. This issue will be also looked at during the next formal review of the SMTP, expected to take place within the next 2-3 years, with a view on providing an updated guidance on the matter, based on the practical experiences and feedback received from course delivery partners;

The recommendation to monitor the course delivery process and collect student feedback, especially as regards their actual workloads to complete the modules: the ITU will implement systematic monitoring of course delivery through the work of steering committee established with program delivery partners as part of the cooperation agreement framework. The results of global developments in spectrum management as elaborated during the World Radio Conferences will also be taken into consideration. The program delivery partners will be asked to include questions as regards experienced workload as part of training feedback collected from participants at the end of each course/module delivery session. Collected and systematised data will be analysed as part of aforementioned formal course review exercise and may thereafter impact adjustments to course content or delivery guidelines;

The recommendation on maximum proportion of multiple choice examination: the ITU appreciates the advise and will include the suggested threshold into the delivery guidance offered to the course delivery partners. Also this recommendation will be considered in any further revision of existing modules and development of any new ones, both for SMTP and other courses developed by the ITU Academy;

The recommendation to award 10 ECTS credits for completion of OM3 module: the ITU will implement this recommendation accordingly.