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Erasmus + Project No598241-EPP-1-2018-1-RS-EPPKA2-CBHE-JP
Strengthening Educational Capacities by Building Competences and Cooperation in the Field of Noise and Vibration Engineering
SENVIBE

Report on Tailor-Made Learning Outcomes for LLL Courses

Activity 1.3

Date: 25/08/2019

Content:

1. Introduction

The project SENVIBE 'Strengthening Educational Capacities by Building Competences and Cooperation in the Field of Noise and Vibration Engineering' (598241-EPP-1-2018-1-RS-EPPKA2-CBHE-JP):

https://senvibe.uns.ac.rs/

has been approved for financing under the call Erasmus+ Capacity Building in Higher Education EAC/A05/2017, and will be coordinated by University of Novi Sad (UNS) during the period 15 November 2018 – 14 November 2021.

The wider aim of the SENVIBE project is to improve and build national educational capacities, cooperation and competences in dealing with environmental and occupational Noise and Vibration (No&Vib) engineering issues in accordance with ongoing EU integration strategies and the needs identified in Serbia.

One of the specific objectives of the SENVIBE project is to review the provision of Life Long Learning (LLL) courses No&Vib, sometime recognised as courses for Continuing Professional Development (CPD) required by engineers to upskill or retrain in a new discipline area. They can also cover, especially in the UK, an accredited competence qualification that will legally allow completion work or noise surveys etc., to be officially recognised and accepted. This document summarises the majority of such provision in the UK, but the nature of these courses mean that private suppliers are at liberty to offer more courses and typically bespoke courses for companies, industry sectors, etc., which will be planned and given on an ad-hoc basis. In general, the provision of courses to meet professional development and retraining requirements can be broadly divided into three categories. The latter description are often related to the course provider and the final outputs, ranging from completion attendance certificates to formal and recognised competence or academic credit bearing taught courses. The length of the courses can typically last from one up to five days in duration, either open to all delegates or attendees or some are restricted to only being available or relevant to professionally qualified engineers, students or practicing engineers. This brief report covers the main academic providers, professional institutions and lastly the commercial sector, e.g. private companies, consultancy units, etc., and the courses described will be presented in this order of grouping.

A similar overview of the LLL course in the No&Vib fields, is also given for Serbia, based on the pieces of info available on-line. These two groups of courses listed for the UK and Serbia enable one to compare them mutually, put them in the context of the situation on the market and education in Serbia, distinguish the shortcoming for the LLL courses and Serbia so as to set the learning outcomes for future SENVIBE LLL courses.

This Report Regards Task 1.3 [1]contains:

a) Review of existing and representative LLL courses in the field of Noise & Vibration (Section 2);
b) Tailor-made learning goals and outcomes for SENVIBE LLL courses (Section 3).
c) Summary and conclusion.

[1] The task can be seen at the website of the SENVIBE project, web-site https://senvibe.uns.ac.rs/about/#Outcomes.

2.Review of existing and representative LLL courses in the field of Noise & Vibration

2.1. Academic Life Long Learning Course providers in the UK

Title	**Advanced Course in Noise and Vibration**
Organizer	ISVR, University of Southampton
Targeted group (description of type of trainees and their number per training – if known)	It is typically attended by engineers or research scientists as part of Continuing Professional Development (CPD), but no formal assessment is involved. Number of trainees: individual: typically 30 - 50 trainees
Educational goals	It covers both two days of optional Refresher Course, in the fundamentals of sound and vibration, followed by three days that can be in either of the two areas of Aeroacoustics or Noise Control. All the activity is lecture room based, although visits to the ISVR's research facilities and informal discussion with the academic staff is encouraged and welcome.
Educational outcomes	Familiarity with the fundamentals (in days 1-2) followed by specialist lectures for those who will be actively pursuing research, technology development or real life problem solving.
Teaching methods	Lectures
Duration	Five days in total (six lectures of 45 minutes each a day).
Comments/ notes	-
Link, Date of Access	Link: https://www.southampton.ac.uk/engineering/cpd/courses/isvr_advanced_courses.page Date of access: 17.06.2019.

Title	**Varied titles and coverage as the courses are bespoke and to order**
Organizer	ISVR Consultancy Services, University of Southampton
Targeted group (description of type of trainees and their number per training – if known)	Bespoke and specifically requested and designed short courses, taught by a combination of academics and practicing noise and vibration engineering consultants. Number of trainees: individual: typically 5-20 trainees
Educational goals	Typically in areas such as automotive engineering or noise control/design and will typically combine lectures, practical exercises as well as instruction on the use of software and instrumentation etc.
Educational outcomes	Training of engineers and scientists, typically employed in industries involving problem solving, design of new products or quality control. The training is normally to develop in-house skills for the employees attending the courses.
Teaching methods	Lectures, practical classes and software use/instruction.
Duration	Typically two to five days in total (up to six lectures of 45 minutes each or other practical activities in a day).
Comments/ notes	-
Link, Date of Access	Link: https://www.isvr.co.uk/courses/index.htm Date of access: 17.06.2019.

Title	**Aircraft Noise**
Organizer	University of Manchester
Targeted group (description of type of trainees and their number per training – if known)	It is typically attended by University staff, External researchers, Alumni This course is addressed to professionals, engineers, scientists and graduate students with interest in the effects of noise emissions from an engineering and technology point of view. Target businesses include commercial airlines, air traffic control, aviation organisations and regulators, aircraft and power plant manufacturers, aircraft designers, policy makers, aviation consultancy businesses, graduate students and academics. Number of individuals: typically 30 - 50 trainees
Educational goals	The course addresses the wider aircraft problems, but it will focus specifically on the engineering aspects of generation, propagation and mitigation of aircraft noise. This course deals with commercial airplanes powered by gas-turbine engines. Unique features of this course include multi-disciplinary analysis of aircraft noise: aerodynamics, propulsion, acoustics, outdoor sound propagation, flight physics, numerical optimisation, system engineering, certification and regulations, and stochastic analysis.
Educational outcomes	Familiarity with the noise sources and predictive models, with an ability to perform noise footprint calculations for aircraft operations.
Teaching methods	Seven lectured sessions with case studies and practical demonstration and instruction in the use of in-house noise simulation software (FLIGHT).
Duration	It covers two days in total.
Comments/ notes	
Link, Date of Access	Link: http://events.manchester.ac.uk/event/event:kee-jptsyt3g-cefqf7 Date of access: 17.06.2019.

Neither Salford University nor London South Bank University (LSBU who offer an MSc in Environmental and Architectural Acoustics) appears to generally offer courses although they might on request. Derby University offers competence certificate type courses, in conjunction with the Institute of Acoustics and these courses will be described in the next session, as a number of other providers also are part of that scheme.

2.2 Competence and officially recognised courses administered by the Institute of Acoustics (IOA) (see https://www.ioa.org.uk/education-and-training)and others

The IOA are the main providers of approved professional courses, typically over 5 days for practitioners in noise measurements, building acoustic measurements, occupational exposure to hand arm vibration, workplace noise risk assessment and environmental noise measurement (see https://www.ioa.org.uk/education-and-training). As a relatively small number of personnel work directly in the IOA, the IOA takes on the role of overseeing the delivery, accreditation and quality assurance of the provision and assessment of this courses at a number of centres in the UK including Derby and Solent Universities, the University of Strathclyde, the University of the West of Scotland, the Institute of Naval Medicine, Leeds Beckett University, LSBU, Liverpool University and in addition a number of commercial companies and acoustic consultancies. The IOA appoints a Chief Examiner for each competence course and member of the relevant Standards and overriding institution setting the competence requirements review and moderate the assessments and results. A number of these courses run more than once per year at each centre and the wide coverage of the locations ensure that the courses are available within the whole of the UK within a reasonable travel distance.

Available courses (IOA and its accredited centres):

Title	**Certificate of Competence in Building Acoustics Measurement (CCIBAM)**
Organizer	Institute of Acoustics
Targeted group (description of type of trainees and their number per training – if known)	The main principle is to admit all who will benefit from the Certificate programmes. However, students will need to be numerate and to be able to carry out scientific calculations. The Certificate may be used towards satisfying the educational requirements for Technician membership of the IOA (TechIOA) but relevant passes at GCSE level or equivalent may be necessary also. Study Number of individual: typically 30 - 50 trainees
Educational goals	The main aim of CCIBAM is to train delegates to carry out and report upon sound insulation tests on walls and floors, in accordance with relevant standards and regulatory instruments. Although the course is specifically centred around measurements according to the requirements of ISO 16283 parts 1 and 2, it is also relevant for other situations including Building Regulation requirements (Annex A of Technical Guidance Document E in Ireland, Annex B of Approved Document E in England, Booklet G in Northern Ireland, Technical Handbook 2010 Section 5 in Scotland), and acoustics in schools, hospitals (Health Technical Memorandum 08-01) and offices, but will not cover in detail wider aspects contained in various parts of ISO 140 such as sound insulation of façades, ceilings, small building elements or laboratory testing. Although the design and detailed specification of sound insulation of walls and floors is beyond the scope of this course, it is expected that delegates will gain some understanding of the principles and practice involved in achieving good sound insulation, and familiarity with some of the standard forms of construction commonly encountered, sufficient for them to recognise and report on the types of construction tested and any obvious defects affecting sound insulation performance.
Educational outcomes	At the end of the course delegates should be able to: • Combine, average and subtract decibel values. • Set up and calibrate sound source and measuring equipment and perform simple routine checks to ensure that the equipment is working properly. • Select suitable measurement numbers, locations and durations and ensure suitable measurement conditions. • Measure octave and 1/3

	octave band sound pressure levels, and, where necessary make correction for background noise. • Calculate dBA and dBZ levels from octave or 1/3 octave band levels. • Measure reverberation time using both a steady state source (loudspeaker) and transient source, and be able to critically assess the reasonableness of the results. • Correctly use the available dynamic range of equipment and avoid measurement problems caused by overload and under range of equipment. • Carry out airborne and impact sound insulation tests in accordance with I.S. EN ISO 16283 parts 1 and 2. • Use proprietary software or a spreadsheet (supplied or self-generated) to calculate relevant metrics in accordance with associated standards, (for example DnT,w and L'nT,w values in accordance with I.S. EN ISO 717 parts 1 and 2.) • Understand the difference between ISO 16283 and other guidance, including Appendix A of Technical Guidance Document E (TGDE). • Understand the concepts of direct, reverberant, near and far sound fields and explain their relevance to sound insulation testing. • Understand the principles of sound transmission for single and double leaf constructions (the effects of mass, coincidence, flanking secondary layers, holes and gaps, etc.) • Identify and report any deviations from the recommended measurement and calculation procedure. • Write a report of sound insulation tests to meet the requirements of I.S. EN ISO 16283.
Teaching methods	$2^{3/4}$ classroom based instruction $1^{1/4}$ practical based instruction and report writing 1 day examination
Duration	It covers five days in total.
Comments/ notes	
Link, Date of Access	Link: https://www.ioa.org.uk/sites/default/files/CCIBAM%20Syllabus%202016.pdf Date of access: 17.06.2019.

Title	**Certificate of Competence in Environmental Noise Measurement (CCENM)**
Organizer	Institute of Acoustics
Targeted group (description of type of trainees and their number per training – if known)	The main principle is to admit all who will benefit from the Certificate programmes. However, students will need to be numerate and to be able to carry out scientific calculations. The Certificate may be used towards satisfying the educational requirements for Technician membership of the IOA (TechIOA) but relevant passes at GCSE level or equivalent may be necessary also. Study Number of individual: typically 30 - 50 trainees
Educational goals	This five-day course seeks to provide delegates with a basic knowledge of the methodology of environmental noise measurement, including the use and accuracy requirements of sound level meters and analysers and to enable them be aware of the significance of measurement data against the framework of standards and legislation for environmental noise.
Educational outcomes	The course aims to provide candidates with: • a basic knowledge of the methodology of environmental noise measurement, including, in particular, the use and of sound level meters and analysers; • an appreciation of the role of measurement data within the framework of standards and legislation for environmental noise. After successfully completing the course, candidates should be able to: • understand basic acoustic principles • perform basic noise calculations involving noise indices appropriate for consideration of environmental noise • make reliable measurements of background noise and noise from a variety of sources, according to the requirements of the relevant British Standards or guidance documents; • present and interpret measurement data in a form suitable for inclusion in a report; • describe measurement methodologies used and the data acquired and appreciate the measurement information required for reports and environmental appraisals.
Teaching methods	20 hours classroom based instruction 10 hours practical based instruction and report writing 1 day examination
Duration	It covers five days in total.

Comments/ notes	
Link, Date of Access	Link: https://www.ioa.org.uk/sites/default/files/CCENM%20Syllabus.pdf Date of access: 17.06.2019.

Title	**Certificate Course in the Management of Occupational Exposure to Hand Arm Vibration (CMOEHAV)**
Organizer	Institute of Acoustics
Targeted group (description of type of trainees and their number per training – if known)	The main principle is to admit all who will benefit from the Certificate programmes. However, students will need to be numerate and to be able to carry out scientific calculations. The Certificate may be used towards satisfying the educational requirements for Technician membership of the IOA (TechIOA) but relevant passes at GCSE level or equivalent may be necessary also. Study Number of individual: typically 30 - 50 trainees
Educational goals	This five-day course seeks to enable course delegates to appreciate the nature of Hand-Arm Vibration hazards in the workplace and the need to protect employees from hand-arm vibration syndrome and to advise and assist employers to meet their legal duties under relevant health and safety law, in accordance with current guidance from the Health and Safety Executive. After completing the course delegates should be able to explain the requirements of current legislation, identify situations where hazards exist and assess the risk, discuss basic techniques for control of vibration exposure and identify areas where vibration reduction is required, assess the effectiveness of vibration control measures, evaluate the daily vibration exposures of employees from information about measured vibration magnitudes and work patterns and explain the uses and limitations of personal protective equipment.
Educational outcomes	The aims of the course are two-fold: • to enable course delegates to appreciate the nature of Hand-Arm Vibration (HAV) hazards in the workplace and the need to protect employees from hand-arm vibration syndrome (HAVS) • to enable them to advise and assist employers to meet their legal duties regarding HAV, under relevant health and safety law in accordance with current guidance from the

	Health and Safety Executive Objectives After completing the course delegates should be able to: • explain the requirements of current legislation • identify situations where HAV hazards exist and assess the risk • discuss basic techniques for control of vibration exposure and identify areas where vibration reduction is required • assess the effectiveness of vibration control measures • evaluate the daily vibration exposures of employees from information about measured vibration magnitudes and work patterns • explain the uses and limitations of personal protective equipment
Teaching methods	4 days classroom based instruction including practical based instruction and assessment of exposure. 1 day written examination and case study coursework
Duration	It covers five days in total.
Comments/ notes	
Link, Date of Access	Link: https://www.ioa.org.uk/sites/default/files/CCHAV%20Syllabus.pdf Date of access: 17.06.2019.

Title	**Certificate of Competence in Workplace Noise Risk Assessment (CCWNRA)**
Organizer	Institute of Acoustics
Targeted group (description of type of trainees and their number per training – if known)	The main principle is to admit all who will benefit from the Certificate programmes. However, students will need to be numerate and to be able to carry out scientific calculations. The Certificate may be used towards satisfying the educational requirements for Technician membership of the IOA (TechIOA) but relevant passes at GCSE level or equivalent may be necessary also. Study Number of individual: typically 30 - 50 trainees
Educational goals	This Certificate course aims to provide a recognised course of education and training to enable persons to carry out workplace noise assessments in a competent manner, as required by the Control of Noise at Work Regulations 2005. Since the course was first run in 1989, more than 2000 people have gained the Certificate. With the introduction of the new Regulations in 2005, demand for competent noise

	exposure assessments is increasing and this course provides those registering with the latest information and training to meet the demands of this new legislation. It is designed to provide a background of basic acoustics combined with `hands on' practical experience of industrial noise measurements and associated assessment of workplace noise exposure. The aims of the CCWPNRA Course are two-fold. • To enable candidates to appreciate the nature of noise hazards in the workplace and the need to protect the hearing of employees. • To enable candidates to advise and assist employers to meet statutory duties relating to noise in the workplace.
Educational outcomes	After completing the course, candidates should be able to: • Explain the requirements of the current legislation and regulations. • Understand the elements of a noise risk assessment, and the part that noise exposure assessment plays. Make satisfactory measurements of noise levels in workplaces. • Assess daily noise exposure levels of employees from information about noise levels and work patterns. • Advise on the components of a noise action plan. • Select suitable hearing protection. • Identify areas where noise reduction is required and discuss basic noise control techniques.
Teaching methods	24 hours classroom based instruction 4 hours practical based instruction 1 day written and practical examinations
Duration	It covers five days in total.
Comments/ notes	-
Link, Date of Access	Link: https://www.ioa.org.uk/sites/default/files/CCWPNRA%20Syllabus_0.pdf Date of access: 17.06.2019.

Title	**Certificate of Proficiency in Anti-Social Behaviour etc. (Scotland) Act 2004 - Noise Measurements (CCASBN)**
Organizer	Institute of Acoustics

Targeted group (description of type of trainees and their number per training – if known)	The ASBA course is approved by the Royal Environmental Health Institute of Scotland (REHIS) and the Institute of Acoustics and relates to the implementation of the noise provisions of Anti-Social Behaviour Act in Scotland. It is a five-day course. For those with such a qualification it is available as a one-day refresher course (corresponding to the final day of the longer course). Study Number of individuals: typically 30 - 50 trainees
Educational goals	The five-day version of the course seeks to provide delegates with a basic knowledge of the principles, terminology and methodology of neighbourhood noise measurements, including the use, calibration and accuracy requirements of sound level meters and to make them aware of the significance of resulting data in the context of the legislation.
Educational outcomes	It is designed to enable successful candidates to make and report the required noise measurements in a competent manner. For those without a prior qualification in acoustics and noise measurement recognised by the Royal Environmental Health Institute of Scotland (REHIS) and the IOA.
Teaching methods	26 hours classroom and practical based instruction 1 day written and practical examinations
Duration	It covers five days in total.
Comments/ notes	-
Link, Date of Access	Link: https://www.ioa.org.uk/sites/default/files/ASBA%20syllabus%20.pdf Date of access: 17.06.2019.

HSE Solutions, formerly the Health and Safety Laboratory

The UK Health and Safety Regulations incorporate the The Control of Vibration at Work Regulations 2005 and a two-day course on this area are provided by the HSE part of the Health and Safety Executive as well as a one-day workshop on Occupational Noise Control. The details are given in the tables below.

Title	**Hand Arm Vibration Syndrome (HAVS)**
Organizer	Health and Safety Laboratory
Targeted group (description of type of trainees and their number per training – if known)	This comprehensive and highly rated course is designed for occupational health nurses, occupational physicians, GPs with an interest in occupational health and hand surgeons. Study Number of individual: typically up to 20 per course
Educational goals	This is primarily considering hand-arm vibration at work, e.g. the use of power tools and subsequent health risks or consequences. The Control of Vibration at Work Regulations came into force in the UK in 2005.
Educational outcomes	Coverage and skills in the area of Legal requirements; Calculation of cumulative vibration exposure Risk assessment; Pathophysiology; Control of vibration exposure; Clinical examination; Diagnosis; Standardised clinical and laboratory tests; Staging; Tier 1 to 5 health surveillance; Case management; Health record and medical report writing. The opportunity to validate your monofilaments.
Teaching methods	As part of the course there will be parallel workshops and Objective Structured Clinical Examinations (OSCEs) to develop your practical skills in addition to classroom based instruction.
Duration	It covers two days in total.
Comments/ notes	At the end of the course there will be an assessment and those who are successful will receive a certificate from the Faculty of Occupational Medicine (FOM).
Link, Date of Access	Link: http://www.hse.gov.uk/vibration/hav/index.htm and https://hsl.gov.uk/health-and-safety-training-courses/hand-arm-vibration-syndrome-(havs) Date of access: 20.06.2019.

Title	**Noise - Occupational Noise Control Workshop**
Organizer	Health and Safety Laboratory
Targeted group (description of type of trainees and their number per training – if known)	Health and safety professionals, project, maintenance and sales engineers who are involved in all aspects of noise and noise management and who need to be able to evaluate, specify, cost and / or implement noise control measures in the workplace. Study Number of individual: typically up to 20 per course
Educational goals	This primarily covers dealing with noise problems quickly and cheaply using simple engineering solutions, removing reliance on ineffective hearing protection.
Educational outcomes	Coverage and skills in the area of Legal requirements; HSE attitude to noise control and the regulatory requirements Using conventional acoustic materials and control measures How to evaluate and cost the noise control options in their workplaces Applying low cost engineering noise control techniques on their sites Acquiring detailed solutions to the 10 most common noise problems Details of free online noise control resources
Teaching methods	Classroom based teaching with demonstrations and practical advice.
Duration	It covers one day in total.
Comments/ notes	-
Link, Date of Access	Link: https://www.hsl.gov.uk/health-and-safety-training-courses/noise-control-workshop Date of access: 20.06.2019.

Other professional institutions overlap in this area and examples of the latter include courses accredited by NEBOSH (The National Examination Board in Occupational Safety and Health). Courses are available under the CIEH (The Chartered Institute of Environmental Health https://www.cieh.org/) and cover issues on general health and safety, including hazards and conditions including the impact of noise and noise

annoyance. Similarly, BOHS (The Chartered Society for Worker Health Protection http://www.bohs.org/) which offer an occupational hygiene module covering the basic principles of noise (see https://www.diamondenv.co.uk/diamond-environmental-training-services/ for an example provider).

2.3 Private course providers in the UK

There are a number of non-academic courses available, primarily to support the provision of sound and vibration software or hardware and is normally tied into training on the particular product or market. One such supplier is Industrial Noise and Vibration Centre (INVC), previously part of Lucas Industries; see http://www.invc.com/training-section/training/ More generic Health and Safety providers such as Phoenix (see https://www.phoenixhsc.co.uk/) also cover training in sound and vibration as does the IOM (https://www.iom-world.org/). Courses provided by commercial software suppliers include those given by Siemens (Siemens PLM Software) see https://training.plm.automation.siemens.com/courses/finder.cfm?region=&filterloc=144 for example. Likewise instrumentation suppliers, such as Bruel and Kjaer (see https://www.bksv.com/en/Training) and Polytec on laser vibrometry etc., (see https://www.polytec.com/uk/service-support/) offer technical support and training on their products.

2.4 Course providers in Serbia

Title	**Get Acquainted with the Law on Noise Protection in the Environment**
Organizer	Akademija OxfordM Trg Marije Trandafil 14, Novi Sad + additional cities
Targeted group (description of type of trainees and their number per training – if known)	Type of trainees: Representatives of local self-government units, official representatives of professional organizations responsible for noise measurement, as well as those planning to develop strategic noise maps, and others. Number of trainees: individual: 1 trainee half-individual: 2 trainees group: 4-8 trainees
Educational goals	To get acquainted with the Law on noise protection in the environment (regulation adopted in 2010) and how it regulates the issues of jurisdiction, rights and obligations of economic entities, natural and legal persons, as well as local self-government units. Introduction to harmonization with European Union regulations in the field of environmental protection and noise issues, as one of its components. The professors will explain that the Law on noise protection in the environment regulates issues such as measures and conditions for noise protection, noise measurement, access to noise information, and control and monitoring of activities important for the protection of the environment and human health. The subjects of noise protection system will also be presented: the Republic of Serbia, autonomous provinces, cities and municipalities, business entities, entrepreneurs, natural and legal persons, public and scientific institutions, as well as associations of citizens. The classes will also cover noise protection measures, which include a preventive aspect (spatial, urban and acoustic planning, arrangement of infrastructure and various types of facilities, acoustic zoning and determination of the regime of use of such areas), sound protection (during design, construction or reconstruction of objects the prescribed types of constructions and materials are applied), determination of the fulfilment of conditions for protection

	against noise and development of strategic noise maps and strategic plans for noise protection.
Educational outcomes	Meet the Law on noise protection in the environment Get to know the subjects of the noise protection system Get to know the noise protection measures
Teaching methods	Lectures
Duration	6 school hours, or 270 minutes (90 minutes a day, 3 days).
Comments/ notes	-
Link, Date of Access	Link: https://www.akademijaoxford.com/kurs-i-obuka-upoznajte-se-sa-zakonom-o-zastiti-od-buke-u-zivotnoj-sredini.php Date of access: 08.05.2019.

Title	**Disturbance of Population by Noise in Environment**
Organizer	Institute of Public Health of Vojvodina, Futoška 121, Novi Sad
Targeted group (description of type of trainees and their number per training – if known)	Doctors, dentists, pharmacists, biochemists, nurses, health technicians
Educational goals	The professors will explain measures and conditions for noise protection and monitoring of activities important for the protection of the environment and human health, and development of strategic noise maps and strategic plans for noise protection.
Educational outcomes	Meet the Law on noise protection in the environment Get to know effects of environmental noise on human health Get to know the noise protection measures
Teaching methods	Lectures

Duration	1 meeting
Comments/ notes	2 points for Continuing education of health workers
Link, Date of Access	Link: http://izjzv.org.rs/?lng=lat&link=3-20-1225 Date of access: 08.05.2019.

Title	**Environmental Expert**
Organizer	Forum Media doo, Kralja Milutina 46-48, Belgrade
Targeted group (description of type of trainees and their number per training – if known)	Persons dealing with environmental issues
Educational goals	Legal and institutional framework in the field of environmental protection. Legal and institutional framework in the field of air protection - key notes, good practices and supporting documents. Requirements for monitoring and air quality requirements. Emissions of airborne pollutants from stationary sources, method, procedure and frequency of emission of pollutants. Legal and institutional framework in the field of noise protection in the environment - key notes, good practices and supporting documents. Legal and institutional framework in the field of protection against ionizing and non-ionizing radiation. Cooperation with administrative bodies, environmental inspection and procedures. Suggestions for improving preventive measures and cost optimization with concrete examples.
Educational outcomes	Fully familiarization with all relevant regulations in the field of environmental protection. Guidelines for the implementation of the necessary preventive measures. Efficient and adequate preparation of necessary documentation for environmental protection.

	Cost-optimization tips for managing the environmental protection system. Knowledge and networking with colleagues from the profession, interactive discussion, examples of good practice and exchange of experiences.
Teaching methods	Lectures
Duration	3 all-day workshop
Comments/ notes	Obtaining Certificate of attendance of an intensive training program for the Serbian Media and Environmental Protection Expert in Forum Media, with the topics listed in the training program
Link, Date of Access	Link: https://forum-media.rs/proizvod/zzs-i-upravljanje-otpadom/program-intenzivne-obuke-za-sticanje-sertifikata-strucnjak-za-zastitu-zivotne-sredine/ Date of access: 09.05.2019.

Title	**Protection Against Traffic Noise**
Organizer	Serbian Chamber of Engineering, Bulevar Vojvode Mišića 37, Belgrade
Targeted group (description of type of trainees and their number per training – if known)	Civil engineers, architects - designers, contractors and investors
Educational goals	Noise issues in urban areas. Displaying noise reduction measures. Methods of noise protection. Development of noise protection projects. Specificity of noise protection through presentation of realized projects. The ability to use EU funds in the field of noise protection. Presentation of experiences in the implementation of EU projects: from application to realization - on the example of the RUCONBAR project.
Educational outcomes	Getting to know the public about the problems of measuring, calculating, designing and making noise protection along the roads.

Teaching methods	Lectures
Duration	1 day
Comments/ notes	Internal code for course: 6349
Link, Date of Access	Link: http://www.ingkomora.org.rs/programi/kursevi/?gr=80&sifra=6349%20%20&prijava=1&post=0 Date of access: 09.05.2019.

Title	"**TRAFFIC NOISE**" - causes of emergence, consequences for exposed population in vulnerable zones on regional roads in the Republic of Serbia and methods of protection (in accordance with European legislation)
Organizer	Serbian Chamber of Engineering Bulevar Vojvode Mišića 37 (2nd floor), Belgrade
Targeted group (description of type of trainees and their number per training – if known)	Civil engineers, architects - designers, contractors and investors
Educational goals	Noise issues in traffic. Displaying noise reduction measures. Specificity of noise protection through presentation of realized projects.
Educational outcomes	Getting to inform the public and engineers about the problems of measuring, calculating, designing and making noise protection along the roads.
Teaching methods	Lectures
Duration	1 day
Comments/ notes	Internal code for course: 3087

Link, Date of Access	Link: http://www.ingkomora.org.rs/programi/kursevi/?gr=80&sifra=3087%20%20&prijava=1&post=0 Date of access: 09.05.2019.

Title	**Workshop - Technologies, Tools and Solutions for Measuring Sound and Vibration**
Organizer	www.automatika.rs
Targeted group (description of type of trainees and their number per training – if known)	Engineers and professionals dealing with automation, signal processing, electronics and other engineering fields
Educational goals	Demonstrations-Acoustic camera for localization of noise sources, Hardware and software for modal analysis, Platforms for acquisition of sound signals and vibrations, their processing (spatial, octal analysis ...) and making reports. Workshop-Configuration of hardware and system software, Data acquisition (vibration, microphone, tacho), Signal Processing (FFT, SNR, SINAD, THD + N, Order Analysis ...) Selection of software and hardware platform-Portable vs. embedded system, Application solutions - ModalVIEW and VibDaq, Graphic Programming Tools – LabVIEW, Support of ISO / IEC 61672-1: 2002 standard.
Educational outcomes	During the workshop trainees will acquire, analyze and display sound and vibration signals using NI hardware and NI LabVIEW.
Teaching methods	Lectures, demonstrations
Duration	1 day
Comments/ notes	
Link, Date of Access	Link: https://www.automatika.rs/desavanja/seminari/ni-radionica-tehnologije-alati-i-resenja-za-merenje-zvuka-i-vibracija.html Date of access: 09.05.2019.

Title	**Sustainable Development, Environmental Protection and Health Impact Factors**
Organizer	SAN EKO, Vidikovacki venac 9, Belgrade
Targeted group (description of type of trainees and their number per training – if known)	Nurses and health technicians
Educational goals	Trainees will be informed about the impact of environmental factors on health (water, air, soil, radiation, noise, food and objects of general use), proper waste management (medical, electrical, and electronic waste) and applying environmental standards.
Educational outcomes	Contribute to a higher level of knowledge, which can improve health, to express concern for environmental protection, contribute to the implementation of sustainable development and apply it in practice, and everything can improve the environment and the quality of participants' work.
Teaching methods	Lectures
Duration	1 day
Comments/ notes	The program was adopted by the Health Council of Serbia, the program accredited by KE under regular program number 118 D-1-784 / 12.
Link, Date of Access	Link: https://glassrbijeinfo.wordpress.com/razno-2/dogadanja/seminari/seminari-sanitarno-ekolosko-drustvo-san-eko/ Date of access: 09.05.2019.

Title	**Mobius Institute Vibration Technician Category I**
Organizer	TRC PRO d.o.o. Preradovićeva 31, Petrovaradin
Targeted group (description of type of trainees and their number per training – if known)	Intended for persons responsible for collecting data on the ground (collecting data in the route)

Educational goals	Trainees will be authorized by their superiors for single channel measurements of mechanical vibrations on rotary machines
Educational outcomes	1. Overview of maintenance techniques and maintenance by condition 2.Basic principles of mechanical vibration 3. Data acquisition 4. Signal processing 5. Maintenance by condition 6. An analysis of rotary machine failure 7. Corrective activities 8. Knowledge of equipment 9. Equipment Acceptance Tests
Teaching methods	Lectures, demonstrations
Duration	4 days + ½ day for testing
Comments/ notes	
Link, Date of Access	Link: https://www.trcpro.rs/obuka-i-seminari/index.html Date of access: 05.07.2019.

Title	**Mobius Institute Vibration Technician Category II**
Organizer	TRC PRO d.o.o., Preradovićeva 31, Petrovaradin
Targeted group (description of type of trainees and their number per training – if known)	Intended for persons who, besides collecting data on the field (route), perform basic vibro-diagnostic analysis
Educational goals	Trainees will be capable of measuring and analysing mechanical vibrations on rotating machines by applying single-channel portable vibration analysers with or without a phase or trigger signal according to pre-established procedures.

Educational outcomes	1. Overview of maintenance techniques and maintenance by condition 2.Basic principles of mechanical vibration 3. Data acquisition 4. Signal processing 5. Maintenance by condition 6. An analysis of rotary machine failure 7. Corrective activities 8. Knowledge of equipment 9. Equipment Acceptance Tests 10. Equipment testing and diagnostics 11. Writing reports and documentation 12. Determining the severity of the failure of the rotating machine
Teaching methods	Lectures, demonstrations
Duration	4 days + ½ day for testing
Comments/ notes	
Link, Date of Access	Link: https://www.trcpro.rs/obuka-i-seminari/index.html Date of access: 05.07.2019.

Title	**Mobius Institute Vibration Technician Category III**
Organizer	TRC PRO d.o.o., Preradovićeva 31, Petrovaradin
Targeted group (description of type of trainees and their number per training – if known)	Intended for experienced vibro-diagnostic engineers who carry a higher level of responsibility within the group for predictive / proactive maintenance
Educational goals	Trainees will be capable of measuring and analysing mechanical vibrations on rotating machines according to pre-established procedures

Educational outcomes	1. Overview of maintenance techniques and maintenance by condition 2.Basic principles of mechanical vibration 3. Data acquisition 4. Signal processing 5. Maintenance by condition 6. An analysis of rotary machine failure 7. Corrective activities 8. Knowledge of equipment 9. Equipment Acceptance Tests 10. Equipment testing and diagnostics 11. Writing reports and documentation 12. Determining the severity of the failure of the rotating machine
Teaching methods	Lectures, demonstrations
Duration	4 days + ½ day for testing
Comments/ notes	
Link, Date of Access	Link: https://www.trcpro.rs/obuka-i-seminari/index.html Date of access: 05.07.2019.

Title	**Workshops - Different Courses for Measuring Sound and Vibration and Using Software Packages**
Organizer	RMS d.o.o**.,** Partizanske avijacije 12/3, Novi Beograd
Targeted group (description of type of trainees and their number per training – if known)	Engineers, health and safety consultants, representatives of local self-government units,
Educational goals	Practical exercises as well as instruction on the use of software and instrumentation for solving problems in airport noise, workplace noise, environmental noise, building acoustics, human vibrations and vibration testing.

Educational outcomes	Training of Engineers, health and safety consultants, representatives of local self-government units to develop in-house skills for the employees attending the courses.
Teaching methods	Lectures, demonstrations
Duration	1 day
Comments/ notes	
Link, Date of Access	Link: http://rms.rs/ Date of access: 28.07.2019.

3. Tailor-made learning goals and outcomes for SENVIBE LLL courses

In order to carry out the development of SENVIBE LLL courses, the corresponding tailor-made outcomes need to be defined. These tailor-made outcomes represent the main aim of the third task of the SENVIBE project (Task 1.3) and this Report is its deliverable.

Based on the comparison of the LLL courses in the No&Vib fields in the UK and the overview of those in Serbia, one can conclude that:

- Courses in the UK are organized by academic institutions and private companies, and only private companies in Serbia (with one state-owned company).
- In the UK there are competence and officially recognised courses administered by the Institute of Acoustics, while in Serbia there are no organized courses on which trainees will obtain an accredited competence qualification to be officially recognised and accepted in the field of Noise and Vibration.
- In the UK there are courses designed for occupational health nurses, occupational physicians in the field of occupational health provided by the Health and Safety Executive. There is one course in Serbia for nurses and health technicians, which is not strictly tied only to noise and vibrations.
- Regarding targeted groups, courses in the UK are typically attended by noise and vibration engineers, academics or research scientists, graduate students and engineering consultants.
- Courses in Serbia are typically attended by representatives of local self-government units, official representatives of professional organizations responsible for noise measurement, as well as those planning to develop strategic noise maps, doctors, health technicians, persons dealing with environmental issues, civil engineers, architects - designers, contractors and investors, engineers, and professionals Intended for experienced vibro-diagnostic engineers.
- Regarding educational goals, courses in the UK offers the knowledge of fundamentals of sound and vibration, instruction on the use of specialised software and instrumentation, solving of aircraft problems, sound insulation tests etc. Also, most of courses in the UK provide a basic knowledge of the methodology of environmental noise measurement, including the use of sound level meters and analysers, knowledge to carry out workplace noise assessments, also explain the requirements of current legislation, identify situations where hazards exist and assess the risk, discuss basic techniques for control of vibration exposure and identify areas where vibration reduction is required, assess the effectiveness of vibration.
- However, courses in Serbia are more general. They provide the knowledge of the Law on Environmental Noise Protection and how it regulates the issues of jurisdiction, rights and obligations of economic entities, natural and legal persons, measures and conditions for noise protection and monitoring of activities important for the protection of the environment and human health, and development of strategic noise maps and strategic plans for noise protection.

There is a lack for courses including the use of sound level meters, carrying out workplace noise assessments, requirements of current legislation, basic techniques for control of vibration exposure and human vibration assessments. Only a few courses deal with measuring and analysing mechanical vibrations on machines.

- Regarding educational outcomes, courses in the UK offers training of engineers and scientists, typically employed in industries, involving problem solving, design of new products or quality control, and obtaining different certificates (in building acoustics measurements, in environmental noise measurement, in the management of occupational exposure to hand arm and whole body vibration, in Workplace Noise Risk Assessment etc.).
- Courses in Serbia are most oriented on environmental noise, and some courses offer only training for using specific software on noise and vibration topics.
- Teaching methods, both in the UK and Serbia are based on lectures, practical classes, software use and writing reports in some courses.

The following shortcomings of the LLL course in the No&Vib fields in Serbia are apparent:

- In Serbia, there are no organized LLL courses in the No&Vib fields on which trainees will obtain an accredited competence qualification to be officially recognised and accepted in the field of Noise and Vibration.
- LLL courses in Serbia are more general on topics, dealing with many aspects on environmental protection, while topics on noise and vibration are only part of these courses.
- These LLL courses in Serbia provide the knowledge oriented mostly on environmental noise, while workplace noise assessments, requirements of current legislation, basic techniques for control of vibration exposure and human vibration assessments are provided in very limited cases.
- There is a lack for information in LLL courses about effects on noise and vibrations on human health, both on workplace and in the living environment.

Thus, the following learning outcomes are proposed for these courses:

Provisional Title	**Environmental & Occupational Noise and Human Vibration Measurement and Control**
Targeted group (s)	• Technical engineers, • Health and safety consultants, • Environmental and occupational noise measurement expert - official representatives of professional organizations responsible for environmental and occupational noise measurement, as well as persons dealing with noise control, • Human vibration measurement expert - official representatives of professional organizations

	responsible for human vibration measurement, as well as persons dealing with vibration control, • Civil engineers.
Number of trainees	15 trainees per training course
Learning goals	To provide trainees with a basic knowledge of the methodology of environmental and occupational noise and human vibration measurement, including knowledge about methodology for noise and vibration control and standards and legislation for environmental and occupational noise and human vibration, also knowledge about risk assessment and hearing impairment and medical examinations.
Learning outcomes	After completing the course, trainees should be able to understand: • basic acoustic quantities, as well as quantities for describing human vibrations, • knowledge and understand basic principles for noise and vibration reduction; • knowledge and understand basic structure of measurement equipment for noise and vibration; • knowledge and understand the basic procedures for measurements of environmental and occupational noise and human vibration; • make simple measurements of environmental and occupational noise and human vibration from a variety of sources, according to the requirements of the relevant standards and legislation for environmental and occupational noise; • perform basic calculations involving noise and vibration indices appropriate for consideration of environmental and occupational noise and human vibration; • requirements of the current legislation and regulations in the field of workplace noise and vibration protection, • noise and vibration risk assessment, • select suitable personal protection, • knowledge and understand basic structure of measurement report, • contribute to creating a new cooperation or participate in the already established cooperation between all participants (industry, local governments and professional agencies) in the No&Vib fields.

Teaching methods	12 hours classroom-based instructions 4 hours practically-based instruction and report writing
Duration	It covers two days in total.
Comments/ notes	-

Provisional Title	**Environmental & Occupational Noise and Human Vibration Risk Assessment**
Targeted group (s)	• Technical engineers, • Health and safety consultants, • Representatives of national and local self-government units, • Official representatives of professional organizations responsible for noise and vibration measurement. • Labour inspectors.
Number of trainees	15 trainees per training
Learning goals	• Acoustics and vibration basics, • Basic knowledge of the methodology of occupational noise and human vibration measurements and environmental noise measurement, • Knowledge about health effects • Knowledge about standards and legislation for environmental and occupational noise and human vibration and risk assessment. • Examples, solved problems.
Learning outcomes	After successfully completing the course, trainees should be able to: • understand basic acoustic quantities, quantities for describing human vibrations as well as quantities for describing hearing loss; • acquire knowledge and understand health effect of noise and vibration; • acquire knowledge, understand and application of standards and legislation for risk assessment; • acquire knowledge and understand the principle of hearing protection;

	• choose appropriate hearing protectors; • carry out risk assessment from noise and vibration, • contribute to creating a new cooperation or participate in the already established cooperation between all participants (industry, local governments and professional agencies) in the No&Vib fields.
Teaching methods	6 hours classroom-based instructions 2 hours practically-based instruction
Duration	It covers one day in total.
Comments/ notes	

4. Summary and conclusion

This report gives an overview of existing and representative LLL courses in the field of Noise & Vibration (Section 2) in the UK and in Serbia. In the UK, there are Academic Life Long Learning Course providers (3 courses), Competence and officially recognised courses administered by the Institute of Acoustics IOA (5 courses), Health and Safety Solutions (2 courses) and private course providers (6 links reviewed). In Serbia, there are private course providers (11 courses) and one state-owned company.

Based on the comparison of the LLL courses in the Noise & Vibration fields in the UK and the overview of those in Serbia, two types of LLL courses are proposed to be developed and carried out during the SENVIBE project:

1) Environmental & Occupational Noise and Human Vibration Measurement and Control.
2) Environmental & Occupational Noise and Human Vibration Risk Assessment.

Note that these titles are provisional and can be adjusted for the purpose of marketing and attracting suitable target groups of attendees.

Learning goals and learning outcomes are defined for both courses. These courses are seen as appropriate to educate engineers and researchers from various scientific and professional background (mechanical, traffic, environmental and civil engineers), health and safety consultants, official representatives of professional organizations responsible for noise and vibration measurement, as well as persons dealing with workplace and environmental issues etc.

The tailor-made learning goals and outcomes given in this report will be used in the scope of the Work Package 'Development of LLL courses' (WP4).

Compiled by Ivan Lomen and Ivana Kovacic
Novi Sad, 14/07/2019

Parts Prepared by Neil S Ferguson
Southampton, 21/06/2019

Parts Prepared by Ivan Lomen, Bela Prokeš, Milorad Španović (IOH), Momir Praščević (UNI), Branislava Đukić and Miljana Stojšić Stojanovska (UPV)
Novi Sad, 24/08/2019

Approved by the Quality Assurance Group Leader, Name and Surname
Place, Date in the format XX/YY/ZZZZ

Approved by Project Coordinator
Place, Date in the format XX/YY/ZZZZ

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