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**MOBILITY RECOGNITION
FOR INTEGRATION**

MORIN

WP3. Mobility recognition in practice

Manual Writing learning outcomes in higher education course syllabi

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Introduction

The key element of student mobility is the academic recognition of a student's achievement upon returning to their home institution from a mobility (physical, virtual or blended). Learning outcomes are one of the most crucial constituents of the recognition procedure.

Based on the Erasmus+ Programme Guide (2024), the definition of learning outcomes is straightforward and simple stating that they are:

“Statements of what a participant knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.” (Erasmus+ Programme Guide, 2024, p. 453)

Both the home and the host institution must ensure clearly stated learning outcomes in the learning agreement, so the recognition procedure is straightforward providing the student with a smoothly completed recognition of their achievement.

This manual is an output produced within the **MORIN – Mobility Recognition for Integration ERASMUS-EDU-2023-CBHE 101128376** project. It accompanies the deliverable D3.1 *Guidelines for academic recognition via learning outcomes*, a key project output within the third work package in MORIN. The authors compiled this manual in the form of suggestions based on three major resources, Anderson and Krathwohl (2001), the Erasmus+ Programme Guide (2024) and Mager (1984). However, conclusions and resources presented in other deliverables from MORIN, particularly the deliverable [D2.2 Literature review report on mobility recognition practices](#) from the second work package in the project, have also been used for this manual.

The manual presents examples of learning outcomes in four different scientific fields most common at the partner institutions participating in MORIN:

- 1) Mathematics and natural sciences,
- 2) Social sciences and humanities,
- 3) Medical sciences and
- 4) Technical and technological sciences.

Each scientific field is illustrated by five different courses for which the learning outcomes are presented as allocated to three key elements:

- Knowledge,
- Skills and
- Competences.

The research included in the [Literature review report on mobility recognition practices](#) shows that study programmes in the context of European higher education are structured around a clearly defined curriculum, and the individual courses included in the curriculum are outlined in carefully planned

syllabi. The learning outcomes (LOs) are an integral part of a course syllabus which is why during the planning, designing and writing phases, the key is to ensure that learning outcomes are:

➤ **Aligned with course objectives**

LOs should directly support the goals of the course. If the goal is that students acquire certain knowledge, skills and/or competences, the LOs must predict what the student will have learned, achieved and/or mastered by the end of the course.

➤ **Clear and measurable**

LOs should use specific language and quantify expectations. If the students are expected to memorize certain content or master how to perform a specific procedure, the LOs must predict a scale or any other instrument providing data that can quantify the level of mastery or performance.

➤ **Balanced**

LOs should equally cover and include the three fundamental elements that the LOs, as suggested in the *Guidelines for academic recognition via learning outcomes*, are based on, i.e. knowledge, skills and competences.

➤ **Specific and relevant**

LOs should be tailored to the course and students' needs. If the course expects the students to acquire certain knowledge, master a skill or develop a specific competence, the LOs have to align with that expectation.

➤ **Challenging:**

LOs should promote higher-order thinking. At the level of higher education, students are expected to employ higher-order thinking skills which include analysis, synthesis and evaluation. LOs have to include these.

➤ **Applied**

LOs should connect to real-world situations. Contemporary higher education study programmes are designed to equip students with knowledge, skills and competences they will be able to use in their future workplace. The LOs must include this expectation.

Bloom's taxonomy

Bloom's Taxonomy and Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) are key tools for both teachers and instructional designers as they provide the major guidelines to follow when planning an education procedure. Bloom's taxonomy aimed at providing Educational Objectives based on a set of learning objectives is still considered essential in structuring and understanding a learning process.

In his taxonomy, Bloom focused on the cognitive domain. He categorized and ordered six different categories of thinking skills seen as a continuum from lower-order to higher-order thinking skills.

- **Lower-order thinking skills**
Knowledge > Comprehension > Application
- **Higher-order thinking skills**
Analysis > Synthesis > Evaluation

Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) suggests verbs instead of nouns for each category as they describe the activities, actions and processes teachers undertake in their daily routines. In addition, the knowledge category was renamed as remembering because knowledge is an outcome or product of thinking. Comprehension and synthesis were renamed as understanding and creating respectively because these two verbs reflect the nature of the thinking skill defined in each category, and creativity was identified as the highest thinking skill in the order. Each level includes a certain set of skills which are categorized as follows:

Order	Bloom's taxonomic levels	Revised taxonomic levels	Skills
Lower-order thinking	Knowledge	Remembering	<i>recognising, listing, describing, identifying, retrieving, naming, locating, finding</i>
	Comprehension	Understanding	<i>interpreting, summarising, inferring, paraphrasing, classifying, comparing, explaining, exemplifying</i>
	Application	Applying	<i>implementing, carrying out, using, executing</i>
Higher-order thinking	Analysis	Analysing	<i>comparing, organising, deconstructing, attributing, outlining, finding, structuring, integrating</i>
	Evaluation	Evaluating	<i>checking, hypothesising, critiquing, experimenting, judging, testing, detecting, monitoring</i>
	Synthesis	Creating	<i>designing, constructing, planning, producing, inventing, devising, making</i>

Whether Bloom's nouns or the verbs from the revised taxonomy are used, LOs should include the suggested **vocabulary** as it targets those aspects of knowledge, skills and competences that students are expected to have at the end of a learning process.

How to write learning outcomes

The most confusing element in a syllabus is the difference between objectives and outcomes. The former are the results **planned** to be achieved while the latter are the results **projected** to be achieved.

An excellent tool that can aid the writing of LOs is the ABCD model (Mager, 1984), an acronym standing for the following:

- A: Audience or who you are teaching.
- B: Behaviour or what you want them to be able to do.
- C: Conditions or under what circumstances they are expected to perform the behaviour.
- D: Degree or to what extent they have mastered the performance.

When applying the ABCD model for LOs, the A corresponds to the target learners implying that it is essential to consider the students' specific needs, interests and prior knowledge. The B directly aligns with the skills component of LOs. It specifies the observable actions or behaviours that students should be able to demonstrate after completing the course. The C relates to the context or circumstances in which students will apply their knowledge or skills.

The LOs should specify under what conditions students will be expected to perform the desired behaviour. Thus the D corresponds to the level of performance or degree of mastery expected of students. The LOs must indicate the extent to which students are able to achieve the specified behaviour expected of them.

Guidelines for writing learning outcomes

When writing LOs, the following principles are recommended:

- **Align with course objectives:**
 - Ensure that LOs directly support the overall goals and objectives of the course.
 - Consider the specific knowledge, skills and competences that students should acquire by the end of the course.
- **Use clear and measurable language:**
 - Use action verbs (e.g. analyse, apply, demonstrate, evaluate, create) to indicate what students will be able to do.
 - Specify the conditions under which students will perform the task.
 - Define the level of performance expected.
 - Use measurable terms (e.g., "with 80% accuracy") to quantify the expected outcome.
 - Rely on the ABCD model for clearly structured LOs.

Examples

In the examples presented in this manual, the A – audience – component from the ABCD model is not repeated as it is always students attending the specific course illustrated. Bold letters highlight the verbs, i.e. synonyms of the verbs from Bloom’s revised taxonomy which refer to the B – behaviour – component in the ABCD model. Underlined phrases refer to the C – condition – and D – degree – components in the ABCD model. Not all phrases referring to C and D are marked in the illustrated learning outcomes. The main idea is to present models and examples that can easily be adapted to different courses.

Depending on the scientific field, the degree can be expressed either qualitatively or quantitatively. Certain courses, such as those in the humanities, are more frequently expressed qualitatively, while courses from other scientific fields may be expressed numerically or based on a particular scale. The manual illustrates both cases.

In the examples presented here, each behaviour, condition and degree component is allocated to the separate elements of knowledge, skills and competences aligned with the students' needs in a certain course focusing on the most general aspects.

All examples are meant to serve as illustrations only and are not related to any course in particular. The choice of verbs and nouns used in the examples do not exclusively relate to the scientific field that the example belongs to. On the contrary, Bloom's taxonomy and Bloom's revised taxonomy apply to all scientific fields, and the collocations in the examples can be used in various fields as long as they are combined with the terminology relevant to the course that the LOs are written for. As stated at the beginning of this manual, the examples are meant to be suggestions and illustrations demonstrating how to write LOs, so they can easily be related to courses among different higher education institutions.

Mathematics and Natural Sciences

BA Course: Organic Chemistry

Knowledge

Demonstrate a deep understanding of the fundamental principles of organic chemistry, including the structure, properties and reactions of organic compounds.

Accurately differentiate between various functional groups and their characteristic reactions.

Critically analyse existing research in organic chemistry, identifying strengths, weaknesses and potential research gaps.

Skills

Independently design and conduct original organic chemistry experiments, demonstrating the ability to formulate hypotheses, select appropriate experimental techniques and analyse data with precision.

Communicate effectively complex organic chemistry concepts both orally and in writing, through academic publications, conference presentations and teaching materials, achieving a 90% accuracy rate in conveying information to diverse audiences.

Collaborate effectively with researchers from other disciplines to address complex problems in organic chemistry, such as drug design or materials science, contributing significantly to interdisciplinary research projects.

Competences

Consistently apply critical thinking skills to analyse and evaluate organic reactions, mechanisms and spectroscopic data, achieving a 95% accuracy rate in problem-solving and decision-making.

Demonstrate creativity and innovation in developing new synthetic strategies and solving complex organic chemistry problems, resulting in at least 5 original research papers or patents during their academic career.

Conduct research ethically by following laboratory safety protocols, adhering to ethical guidelines and reporting research findings accurately and honestly, maintaining a 100% compliance rate with institutional and professional standards.

BA course: Introductory Physics

Knowledge

Demonstrate a deep understanding of the fundamental principles of classical mechanics, including Newton's laws of motion, energy conservation and momentum conservation.

Accurately apply mathematical concepts, such as calculus and vectors, to solve physics problems.

Critically analyse experimental data and interpret results using appropriate statistical methods.

Skills

Independently design and conduct physics experiments, demonstrating the ability to formulate hypotheses, select appropriate experimental techniques and collect accurate data.

Communicate effectively complex physics concepts both orally and in writing, through academic presentations, lab reports and problem-solving demonstrations, achieving a 90% accuracy rate in conveying information to diverse audiences.

Collaborate effectively with other students and researchers to solve physics problems and conduct experiments, contributing significantly to group projects and research initiatives.

Competences

Consistently apply critical thinking skills to analyse and solve physics problems, achieving a 95% accuracy rate in problem-solving and decision-making.

Demonstrate creativity and innovation in developing new approaches to solving physics problems and designing experiments, resulting in at least 5 original solutions or experiment designs during the course.

Conduct research ethically by following laboratory safety protocols, adhering to ethical guidelines and reporting research findings accurately and honestly, maintaining a 100% compliance rate with institutional and professional standards.

MA course: Advanced Microbiology

Knowledge

Gain a comprehensive understanding of advanced concepts from microbiology, including microbial genomics, metagenomics and microbial ecology.

Acquire proficiency in specialized techniques and methodologies used in advanced microbiology research.

Develop a critical perspective on current research trends and emerging technologies in the field of microbiology.

Skills

Independently design and execute advanced microbiology experiments, demonstrating the ability to formulate research questions, select appropriate experimental techniques and analyse complex data sets.

Communicate effectively complex microbiological concepts both orally and in writing, through academic publications, conference presentations and grant proposals, achieving a 90% accuracy rate in conveying information to diverse audiences.

Collaborate effectively with researchers from other disciplines to address interdisciplinary research questions in microbiology, contributing significantly to collaborative projects and publications.

Competences

Consistently apply critical thinking skills to analyse and interpret complex microbiological data, achieving a 95% accuracy rate in problem-solving and decision-making.

Demonstrate creativity and innovation in developing new research approaches and methodologies in microbiology, resulting in at least 3 original research publications in peer-reviewed journals.

Conduct research ethically by following laboratory safety protocols, adhering to ethical guidelines and reporting research findings accurately and honestly, **maintaining a 100% compliance rate** with institutional and professional standards.

Demonstrate the ability to effectively manage research projects, completing projects within deadlines and adhering to budgets.

PhD Course: Linear Algebra

Knowledge

Demonstrate a comprehensive and structured understanding of advanced linear algebra concepts, including abstract vector spaces, linear transformations and spectral theory.

Accurately apply specialized techniques and methodologies used in linear algebra research, such as numerical linear algebra and computational algebra.

Critically analyse cutting-edge research in linear algebra, identifying emerging trends and potential research directions.

Skills

Independently design and conduct original linear algebra research projects, demonstrating the ability to formulate research questions, select appropriate methodologies and analyse complex data sets.

Communicate effectively complex linear algebra concepts both orally and in writing, through academic publications, conference presentations and grant proposals, achieving a 95% accuracy rate in conveying information to diverse audiences.

Collaborate effectively with researchers from other disciplines to address interdisciplinary research questions involving linear algebra, contributing significantly to collaborative projects and publications.

Competences

Consistently apply advanced critical thinking skills to analyse and interpret complex linear algebra problems, achieving a 98% accuracy rate in problem-solving and decision-making.

Demonstrate exceptional creativity and innovation in developing new theoretical frameworks and applications of linear algebra, resulting in at least 3 original research publications in top-tier journals in the field.

Demonstrate a high level of proficiency in using advanced mathematical software and programming tools, achieving a 95% accuracy rate in technical skills assessments.

PhD course: Advanced Anthropogeography

Knowledge

Demonstrate a broad understanding of advanced anthropogeographic concepts, including critical theory, postcolonialism and feminist geography.

Accurately apply specialized methodologies and techniques used in advanced anthropogeographic research, such as qualitative research, spatial analysis and mixed methods.

Critically analyse cutting-edge research in anthropogeography, identifying emerging trends and potential research directions.

Skills

Independently design and conduct original anthropogeographic research projects, demonstrating the ability to formulate research questions, select appropriate methodologies and analyse complex qualitative and quantitative data.

Communicate effectively complex anthropogeographic concepts both orally and in writing, through academic publications, conference presentations and grant proposals, achieving a 95% accuracy rate in conveying information to diverse audiences.

Collaborate effectively with researchers from other disciplines to address interdisciplinary research questions in anthropogeography, contributing significantly to collaborative projects and publications.

Competences

Demonstrate exceptional creativity and innovation in developing new theoretical frameworks and applications of anthropogeography, resulting in at least 3 original research publications in top-tier journals in the field.

Conduct research ethically by following academic integrity guidelines, adhering to ethical principles and reporting research findings accurately and honestly, maintaining a 100% compliance rate with institutional and professional standards.

Demonstrate the ability to effectively manage research projects, completing projects within deadlines and adhering to budgets.

BA course: Introduction to Sociology

MA course: Cultural Anthropology

Knowledge

Explain in detail the history of anthropological thought, including key figures, schools of thought and their contributions to understanding human culture and society.

Analyse thoroughly the relationship between culture and key concepts such as kinship, religion, gender, power and globalization.

Compare the advantages of different ethnographic methods, including participant observation, interviews and archival research and evaluate their strengths and limitations.

Illustrate in a diagram the impact of cultural diversity and change on human societies using relevant case studies.

Skills

Conduct independent ethnographic research, including formulating research questions, collecting and analysing data and writing ethnographic accounts.

Interpret cultural phenomena using appropriate anthropological theories and concepts.

Communicate research findings effectively in written and oral formats, adhering to academic conventions.

Critically evaluate anthropological texts and engage in scholarly debates.

Competences

Consistently apply anthropological knowledge and skills to address contemporary social issues.

Demonstrate cultural sensitivity and ethical awareness in research and professional practice.

Engage in collaborative learning and intercultural dialogue.

Synthesize by using infographic presentations of diverse perspectives and contribute to the advancement of anthropological knowledge.

PhD course: Applied Linguistics

Knowledge

Explain in depth the major theoretical approaches within applied linguistics, including sociolinguistics, second language acquisition, discourse analysis and pragmatics.

Differentiate with certainty between various quantitative and qualitative research methods, demonstrating a sophisticated understanding of experimental design, corpus analysis and ethnography.

Critically evaluate existing research in applied linguistics, identifying strengths, weaknesses and potential research gaps.

Skills

Independently design and execute original research projects, demonstrating the ability to formulate research questions, select and implement appropriate research methods, analyse and interpret data.

Effectively communicate complex research findings both orally and in writing, through academic publications, conference presentations and teaching materials.

Collaborate effectively with researchers from other disciplines to address complex applied linguistics problems.

Competences

Consistently apply critical thinking skills to analyse and evaluate linguistic data, theoretical frameworks and research methodologies.

Continuously demonstrate creativity and innovation in developing and implementing solutions to complex problems in applied linguistics.

Consistently conduct research ethically, adhering to professional standards and guidelines.

PhD course: Research Methods in History

Knowledge

Explain in detail the core principles, theories and debates in historical research methodology, including their evolution and key proponents.

Accurately differentiate between various research approaches in history, such as quantitative and qualitative methods, oral history, archival research and digital humanities.

Critically evaluate the strengths, weaknesses and ethical implications of different research methods and sources used in historical inquiry.

Illustrate with an infographic presentation the application of various research methods through analysing specific historical case studies and examples.

Skills

Independently design and conduct original research projects in history, formulating clear research questions and hypotheses.

Effectively collect, organize and analyse historical data from diverse primary and secondary sources, including archival materials, oral testimonies and digital databases.

Critically assess the reliability, validity and biases of historical sources and evidence.

Construct with 90% clarity well-structured and persuasive historical narratives and arguments, both orally and in writing, demonstrating analytical rigour and clarity of expression.

Effectively communicate research findings to diverse audiences through scholarly publications, conference presentations and public engagement activities.

Competences

Critically engage with diverse historiographical perspectives and debates, demonstrating intellectual honesty and openness to alternative interpretations.

Apply appropriate research methods and ethical considerations to address complex historical questions and problems.

Demonstrate a commitment to ongoing professional development and innovation in historical research methodology.

Formulate original and insightful contributions to historical knowledge through rigorous research and scholarly dissemination.

Medical sciences

BA course: Biomedical Sciences

Knowledge

Explain in detail the structure and function of human cells and organs, including their molecular, biochemical and physiological processes.

Describe the major human diseases and their underlying pathophysiological mechanisms, including genetic, environmental and lifestyle factors.

Summarize the principles of pharmacology and toxicology, including drug mechanisms of action, pharmacokinetics and adverse effects.

Explain the key concepts in immunology, microbiology and genetics and their relevance to human health and disease.

Identify the ethical and legal considerations in biomedical research and healthcare practice.

Skills

Independently perform common laboratory techniques used in biomedical science, such as microscopy, cell culture and molecular biology techniques, with 90% accuracy.

Analyse thoroughly and interpret experimental data using appropriate statistical methods and software.

Communicate scientific findings effectively in written reports and oral presentations, using appropriate scientific terminology and visual aids.

Critically evaluate scientific literature and identify reliable sources of information.

Work effectively in a team and contribute to collaborative projects.

Competences

Apply scientific knowledge and critical thinking skills to solve problems in biomedical science.

Demonstrate intellectual curiosity and a commitment to lifelong learning in the field of biomedical science.

Adapt to new developments and technologies in biomedical science and healthcare.

Communicate effectively scientific information to diverse audiences, including the general public.

Consistently adhere to ethical principles and professional standards in biomedical research and practice.

BA course: Medical Anthropology

Knowledge

Define precisely the key concepts and theories in medical anthropology, including ethnomedicine, bioculturalism and health disparities.

Explain in written and oral presentations the relationship between culture, health and illness in diverse societies.

Accurately describe the social, cultural and political factors that influence health beliefs and practices.

Precisely identify the major global health challenges and the role of medical anthropology in addressing them.

Skills

Conduct thorough ethnographic research on health-related topics, including participant observation, interviews and focus groups.

Analyse qualitative data using anthropological methods and interpret findings in a culturally sensitive manner.

Critically evaluate different perspectives on health and illness, including those of patients, healers and healthcare providers.

Collaborate closely with communities and healthcare professionals to address health issues and promote well-being.

Competences

Apply anthropological theories and methods to **analyse and interpret** health-related issues in real-world settings.

Demonstrate cultural sensitivity and respect for diverse health beliefs and practices.

Think critically about the social, cultural and political dimensions of health and illness.

Contribute effectively to the development of culturally appropriate health interventions and policies.

MA course: Public Health

Knowledge

Explain the core functions and principles of public health practice, including health promotion, disease prevention and health equity.

Accurately describe the social, environmental and economic determinants of health and their impact on population health outcomes.

Analyse qualitatively the epidemiological principles and methods used to investigate patterns of disease and injury in populations.

Evaluate on a precise scale the role of health policy and healthcare systems in shaping public health outcomes.

Skills

Critically appraise public health research literature, including study design, data analysis and interpretation of findings.

Apply quantitative and qualitative research methods to collect and analyse public health data.

Develop precise evidence-based public health interventions and programs to address specific health issues.

Communicate public health information effectively to diverse audiences, including policymakers, community members and healthcare professionals.

Competences

Advocate for policies and practices that promote population health and reduce health disparities.

Critically evaluate the effectiveness of public health interventions and programs.

Demonstrate leadership skills in public health settings.

Apply ethical reasoning and professional judgment in public health decision-making.

MA course: Bioethics

Knowledge

Explain in detail the core principles and concepts of bioethics, including major ethical theories and their application to healthcare and biomedical research.

Describe in written and oral presentations the ethical dilemmas and challenges arising in various areas of biomedicine, such as genetic engineering, reproductive technologies, organ transplantation, end-of-life care and public health.

Analyse the social, cultural and legal contexts that shape bioethical decision-making.

Skills

Critically analyse complex bioethical cases and apply ethical frameworks to formulate reasoned solutions.

Construct well-supported arguments on bioethical issues, both orally and in writing.

Communicate effectively about bioethical concepts and dilemmas with diverse audiences, including healthcare professionals, policymakers and the public.

Conduct detailed research on bioethical topics using a variety of sources, including academic journals, legal documents and policy reports.

Competences

Independently apply ethical reasoning and critical thinking skills to address bioethical challenges in healthcare and research.

Engage in respectful and constructive dialogue with individuals holding diverse perspectives on bioethical issues.

Advocate for ethically sound policies and practices in healthcare and research.

PhD course: Neuroscience

Knowledge

Explain thoroughly the fundamental principles of neuroscience, including cellular and molecular mechanisms, neural circuits and systems-level organization of the brain.

Describe with precision the major research methodologies used in neuroscience, including neuroimaging, electrophysiology and behavioural techniques.

Independently analyse the relationship between brain function and behaviour, including cognition, emotion and perception.

Evaluate qualitatively current research and literature in specialized areas of neuroscience, such as cognitive neuroscience, developmental neuroscience or neurobiology of disease.

Skills

Critically evaluate primary research articles and **synthesize** findings from multiple sources.

Design and **conduct** neuroscience experiments, including data acquisition, analysis and interpretation.

Communicate research findings effectively in written and oral formats, including presentations and publications.

Independently apply computational and statistical methods to analyse and model neural data.

Competences

Independently formulate research questions and develop innovative experimental approaches.

Collaborate effectively with other researchers and contribute to interdisciplinary research projects.

Consistently demonstrate ethical conduct in research and adhere to responsible research practices.

Contribute to the advancement of knowledge in neuroscience through original research and scholarly activities.

Technical and Technological Sciences

BA course: Computer Science

Knowledge

Differentiate with precision between various programming languages, their syntax, semantics and applications.

Analyse thoroughly existing research in computer science, identifying strengths, weaknesses and potential research gaps.

Understand and critically evaluate software engineering principles, including requirements analysis, design methodologies, testing strategies and quality assurance.

Skills

Design and **implement** efficient and well-structured computer programs in multiple programming languages.

Communicate complex programming concepts effectively both orally and in writing.

Collaborate effectively with other programmers to develop large-scale software systems.

Independently apply programming concepts in specific settings.

Competences

Apply critical thinking skills to analyse and evaluate computational problems, algorithm designs and software implementations.

Demonstrate creativity and innovation in developing new algorithms, data structures and software systems.

Consistently conduct research ethically by following ethical guidelines, adhering to intellectual property rights and reporting research findings accurately and honestly.

Contribute professionally when collaborating with colleagues and clients.

BA course: Information Systems

Knowledge

Thoroughly understand fundamental principles of information systems, including hardware, software, networks and databases.

Identify with 90%-accuracy key components of information systems and their functions.

Explain in detail the role of information systems in organizations and **present the differences** using diagrams and illustrations.

Critically evaluate the impact of information systems on society and business.

Skills

Design very detailed information systems to meet specific organizational needs.

Independently **develop** software applications using appropriate programming languages and tools.

Implement self-sustaining information systems in various environments.

Effectively **troubleshoot** and **resolve** technical problems related to information systems.

Communicate effectively about information systems concepts to technical and non-technical audiences.

Competences

Apply problem-solving skills to analyse, evaluate and **address complex information systems** challenges.

Think critically to evaluate the effectiveness of information systems solutions and suggest applicable solutions.

Collaborate effectively with colleagues and stakeholders to develop information systems.

Demonstrate ethical behaviour in the use and development of information systems.

MA course: Electrical Engineering

Knowledge

Fully comprehend fundamental principles of electrical engineering, including circuit analysis, electromagnetic fields and power systems.

Distinguish with 90%-accuracy between different types of electrical components and their applications.

Critically analyse and evaluate existing research in electrical engineering, identifying key contributions and potential areas for improvement.

Skills

Independently design and implement electrical engineering systems, demonstrating proficiency in circuit design, simulation and testing.

Communicate complex electrical engineering concepts effectively, both orally and in writing, to
diverse audiences.

Collaborate efficiently with other engineers and researchers to solve complex problems in electrical engineering, such as renewable energy systems or smart grids.

Competences

Apply critical thinking skills to analyse and solve electrical engineering problems, demonstrating a high level of accuracy and efficiency.

Consistently demonstrate creativity and innovation in developing new electrical engineering solutions and technologies.

Conduct independent and collaborative research ethically, adhering to professional standards and guidelines.

MA course: Transportation Design

Knowledge

Fully understand and identify the historical development of transportation design, key trends and innovations in transportation design.

Critically analyse the impact of transportation design on society, economy and environment while considering the role of technology in shaping future transportation systems.

Compare and evaluate based on charts and diagrams different transportation modes and their characteristics.

Skills

Independently design and implement innovative and sustainable transportation solutions in various environments and settings.

Collaborate effectively with interdisciplinary teams to develop transportation projects adhering to clearly developed standards.

Conduct detailed research on transportation-related topics using various methodologies.

Communicate transportation design concepts effectively through presentations, reports and publications.

Competences

Apply critical thinking skills to solve complex transportation design problems in various settings.

Demonstrate creativity and innovation in developing transportation concepts while adhering to ethical principles in transportation design practice.

Contribute to the advancement of the transportation design field through research and practice with the outcomes presented in a research paper.

PhD course: Material Science and Engineering

Knowledge

Understand thoroughly the fundamental principles of materials science and engineering, including atomic structure, bonding, crystallography and phase diagrams.

Differentiate with 90%-accuracy between various materials (metal, ceramics, polymers, composites) and their properties.

Critically analyse existing research in materials science and engineering, identifying strengths, weaknesses and potential research gaps.

Evaluate the impact of materials science on various industries and societal challenges.

Skills

Independently design and conduct original materials science experiments, demonstrating the ability to formulate hypotheses, select appropriate experimental techniques and analyse data with precision.

Communicate complex materials science concepts effectively both orally and in writing, through academic publications, conference presentations and teaching materials.

Collaborate with researchers from other disciplines to address complex materials science problems, such as materials for energy, electronics, or healthcare.

Independently apply advanced computational modelling and simulation techniques to study materials properties and behaviour.

Competences

Think critically to analyse and evaluate experimental results, materials characterization data and theoretical models.

Demonstrate creativity and innovation in developing new materials and processes.

Conduct research ethically by following laboratory safety protocols, adhering to ethical guidelines and reporting research findings accurately and honestly.

Contribute to the development of the next generation of materials scientists and engineers.

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