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EUROPEAN APPROACH

MASTER IN INNOVATIVE MANUFACTURING SYSTEMS (MIMS)

UNIVERSITAT DE GIRONA

September 2023

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GLOSSARY

EA: European Approach

EQAR: The European Quality Assurance Register for Higher Education

EHEA: Higher education in the European Higher Education Area

ESG: Standards and Guidelines for Quality Assurance in the EHEA.

MIMS: Master in Innovative Manufacturing Systems

SAR: Self-Assessment Report

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EXECUTIVE SUMMARY

On December 2022, AQU Catalunya received a request for an initial accreditation procedure regarding the joint master programme Master Innovative Manufacturing Systems (MIMS). The programme has been designed by the three partner institutions Universitat de Girona, Politecnico di Torino and the University of Gävle. Also, there are 9 relevant institutions on master's field research.

This is an ex ante evaluation, at the present moment the Master Innovative Manufacturing Systems (MIMS) is not implemented, consequently the assessment is less evidence -based than re-accreditation. On 11th of May take place the on line visit. The visit programme included interviews with the main stakeholders at the design stage: governing board, teaching staff, industry representatives. The visit run fluently and all participants provided valuable input to better understand what the training programme is about. The facilities were shown though videos filmed by every institution.

The three partner institutions agree that innovation and creativity are the added values of the program, and clearly the study programme establishes learning outcomes that point out those values. The study programme structure is divided into four modules of 30 ECTS each: Ideate & Innovate InnoStart (Universitat de Girona); Sophisticate & Prepare (Politecnico di Torino); Execute & Deliver (Gävle University); Master's Thesis Master's Thesis(Three Universities and mobility partners). However, Internal Quality Assurance System has to enhance with procedures and mechanisms to assure that creativity and innovation concepts definitions are shared by all actors involved in the programme, so there is the need to stablish more detailed learning process. In the same sense, it is necessary to develop in more detail other operative procedures and criteria related with mobility, admission and recognition, to assure the effective coordination among institutions.

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GENERAL ASPECTS

Basic information about the procedure

Name of the degree programme	Master in Innovative Manufacturing Systems (MIMS)
Partners Institutions	Universitat de Girona, Politecnico di Torino and the University of Gävle.
Language of instruction	English
Workload	120 ECTS (Full time, only)
Locations	Girona (Spain), Torino (Italy), Gävle (Sweden)

Table 1. Identification data

On December 2022, AQU Catalunya received a request for an initial accreditation procedure regarding the joint master programme Master Innovative Manufacturing Systems (MIMS). The request was submitted on behalf the consortium by the Universitat de Girona, which coordinates the programme.

As this concerns a joint programme issued by three higher education institutions in Sweden, Italy and Spain, AQU Catalunya has informed the national agencies of Sweden, UKÄ, and of Italy, ANVUR. A consideration of national legal frameworks is needed to contextualize this European Approach assessment, Sweden and Italy European Approach is not available to higher education institutions, also, in Spanish context European Approach is not required for joint programs that have been assessed by EQAR recognized Agencies or joint programs that have achieved Erasmus Mundus.

Therefore, the collaboration with both Agencies have been very fruitful. UKÄ and ANVUS have been active during the experts selection panel providing academic experts from their national higher education systems. Also, representatives from UKÄ and AQU Catalunya will join the panel as observers, which means that they attend to the different meetings and visit for training purposes without assessment functions. The assessment panel was appointed in February 2023. AQU Catalunya has informed about panel composition to Universitat de Girona so the institution could indicate any possible conflicts of interest (See brief cv at Annex1).

On March 2023, AQU Catalunya has delivered a training session on European Approach Methodology address to the panel members. Also, the consortium submitted the self - report. Therefore, the individual assessment took place during March and first two weeks of April, and on 24th of April took place the preliminary meeting where the main issues to be addressed were agreed upon during the accreditation visit. Also, the panel ask for further evidences to the MIMS Consortium related to:

Eligibility

- *Support letters and cooperation agreement signed.*
- *Description of coordination Mechanisms between 9 institutes of research partners institution, follow- up procedures, assessment mechanisms of these institutions.*
- *Specific explanation about the role and responsibilities of Austrian Institute of Technology (AIT, Austria) is not a higher education institution.*
- *Detailed explanation about how the mobility to these 9 institutes are going to be founded.*

Learning Outcomes & Study Programme Development

- *An explanation of which is the added Value for the future integration in research (academic or professional).*
- *Diversity Integration (cultural, educational, disability, social)*

Facilities

- *Videos and a detailed information about classrooms, workshops, laboratories from each institution dedicated to the master*

Public information

- *A complete web with a detailed contents description, following EA standards.*

MIMS Consortium provided the information and evidence required before the visit.

On 11th of May take place the on line visit with the following schedule:

Time	Activity
14:00-14:30	Preliminary Meeting of all Cluster Inf Peers
14:30- 15:30	**Meeting with Programme Coordinators and management team**
15:30-15:40	*Disconnection Pause*
15:40-16:40	**Meeting with Teaching Staff**
16:40:- 16.50	*Disconnection Pause*
16:50- 17.30	**Meeting future employers or industry representatives (^)**
17:30 -18:30	*Disconnection Pause + Internal work*
18:30- 18:45	**Preliminary conclusions**

Table 2 On line visit programme

During the panel deliberations after the visit were agreed the main issues, strengths and weakness of the programme according European Approach standards.

The procedure is based on Guide for QA Agencies published at Impea Project website.

The site visit report assessing the fulfilment of the Standards of the European Approach for Quality Assurance of Joint Programmes has been submitted to the Specific commission for Engineering and Architecture from AQU Catalunya. The Specific Commission makes a decision regarding the ex ante accreditation of the programme. Both reports were sent to the joint programme consortium for comments on the 18 of July of 2023.

On the 12 of September the consortium sends their comments that had been reviewed by the panel member including some changes to the previous report. The actual report has been submitted to the Specific Commission to take the final decision.

Panel of experts

Role	Name	Institution	Area of knowledge
Chair	Amparo López	Universitat Politècnica de València	Hydraulic Engineering and Environment
Academic	Fredik Ahlgren	Linnæus University	Computer Science and Marine Engineering
Academic	Alessandro Silvestri	Universtità degli Studi di Cassino e del Lazio Meridionale	Mechanical Engineering
Professional	Javier Socias	Applus+ Iteuve technologies	Industrial Engineering
Student	Mikel Arrese-Igor	Euskal Herriko Unibertsitatea	PhD Science and technology of materials
Secretariat	Esther Adot	AQU Catalunya	Assessment methodology

Table 3. Panel of experts

Caveats

This is an ex ante evaluation, at the present moment the Master Innovative Manufacturing Systems (MIMS) is not implemented, consequently the assessment is less evidence -based than re-accreditation. That means that most of the evidences are committed descriptions about procedures and statements, as well as layouts of websites, assessments and learning activities proposals. The panel members have focused their assessments in the internal

coherence among the learning outcomes and the sustainability and feasibility to achieve them with the resources assigned.

Whenever possible, this Panel's assessments are based on documentary evidence provided by the partner institutions and on answers provided during interviews.

Finally, according the legal framework of the three countries involved, Sweden, Italy and Spain, European Approach is not needed to implement the study programme. Therefore, taking this fact into consideration, the external evaluation using the European Approach methodology shows the consortium's commitment to quality values.

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ELEGIBILITY

Status

The institutions that offer a joint programme should be recognised as higher education institutions by the relevant authorities of their countries. Their respective national legal frameworks should enable them to participate in the joint programme and, if applicable, to award a joint degree. The institutions awarding the degree(s) should ensure that the degree(s) belong to the higher education degree systems of the countries in which they are based.

Evidence

- EQAR registrations
- Agreement but not signed
- Support Letters

The MU Innovative Manufacturing Systems is delivered by three Universities. All three universities are duly registered in EQAR:

- Universitat de Girona (Spain) - DEQARINST0788
- Politecnico di Torino (Italy) - DEQARINST1467
- University of Gävle (Sweden) - DEQARINST2321

Also, there are 9 institutions as mobility partners, where the student could develop the internship linked to the final dissertation of the program:

- University of Turku - DEQARINST0853
- Fraunhofer Institute for Systems and Innovation Research (Non DEQAR register)
- Prague University of Economics and Business (Non DEQAR register)
- Riga Technical University (DEQARINST1648)
- Austrian Institute of Technology ([1]) (Non DEQAR register)
- University Nova de Lisboa (DEQARINST2108)
- University of Novi Sad (Non DEQAR register)
- Technical University of Košice (Non DEQAR register)
- University of Maribor. (DEQARINST2337)

[1] Not an Higher Education Institution

The institutions that offer the joint programme are recognised as higher education institutions by the relevant authorities of their countries. However, their respective national legal frameworks have different approaches to recognize European Approach. Sweden and Italy are not recognizing European Approach external assessment while Spain recognizes it but it is not need it when the program has achieved Erasmus Mundus label or for joint programs: *"The agencies competent for verification purposes (Article 26) will recognise reports issued by agencies registered with EQAR; if it is not registered, then, one Spanish QAA must issue a favourable. The EA can be used as long as the country of the coordinating university has signed the 2015 agreement. There are two situations in which the need for an additional favourable report by ANECA or the competent regional agency is foreseen: if it is a Bachelor of less than 240 ECTS, or if the report is issued by an agency not registered in EQAR*" (Royal Decree 822/2021 of 28 September establishing the organization of university education and training quality assurance). As MIMS is pursuing for ERASMUS level is not necessary European Approach assessment for legal purposes. The main goal of European Approach assessment, in this case, is to provide an external and expert evaluation to reinforce the enhancement and strength the eligibility of the programme for ERASMUS Label.

Finally, it is important to note that the agreement stipulates that the training programme will run from October 2025. And also, stipulates the following: "The partners agree that MIMS will only be initiated once it obtains recognition of the program by Erasmus Mundus with the European Education and Culture Executive Agency (EACEA) under the powers delegated by the European Commission for implementation of the action: Erasmus+ Erasmus Mundus Joint Master."

Assessment

The panel considers the partner institutions that offer the joint programme are recognised as higher education institutions by relevant authorities in their countries and registered in EQAR. The institutions collaborating in internships have a recognized research experience in academic field related with MIMS. It is considered a strength that the results of the survey conducted by the European Manufacturing Survey (EMS) coordinated by the Fraunhofer Institute for Systems and Innovation Research have been taken into account in the design of the degree programme. Of the institutions involved in this survey, nine of them dedicated to research related to the objectives of the master's degree collaborate in the development of the final master's thesis, offering internships and co-direction.

Although the nine institutions include some that are not higher education institutions, it is considered that their research activity is sufficiently relevant to add value to the proposed training programme.

Compliant

Joint design and delivery

The joint programme should be offered jointly, involving all cooperating institutions in the design and delivery of the programme.

Evidence

- Agreement
- Support Letters
- SAR
- EMS support and coordination mechanisms for MIMS

The self-report describes that for the design of the programme, a defined working group of 2 academics and a technician (senior- technician or administrative from each university has been created (9 persons in total). It has been established that the University of Girona will be the coordinating institution and that it will be assisted by the following boards:

The Academic Board (AB) is expected to meet at least twice a year. The board members are: master coordinator, course directors from the three universities; At least three academic delegates from the three universities; at least three administrative representatives from the three universities; Two student representatives

The Quality Board (QB) it will meet once a year. The QB is composed by one representative of each university, at least one representative of the academic associated partners, two student representatives, and at least one external evaluator.

Industrial board (IB): The IB will be composed by one representative of each university and by at least two, but preferably four, external advisors from industrial partners. Once a year.

Another important aspect to consider is that proposal has received funding from the EU within the framework of the call ERASMUS-EDU-2021- EMJM-DESIGN for the design of new joint programs in the Erasmus Mundus framework. The Erasmus Mundus Design Measures has stablished that the following join mechanisms:

- *joint procedures for student application, admission, selection and monitoring*
- *rules and procedures for student examinations and performance evaluation*
- *joint programme design and integrated teaching/training activities*

- *common services offered to students*
- *joint promotion and awareness-raising strategy*
- *joint administrative and financial management by the partnership*
- *a joint degree policy*
- *a draft partnership agreement*
- *a draft joint student agreement*

Assessment

The programme is divided into four modules, each of which is taught by one of the universities:

- Ideate & Innovate InnoStart (30 ECTS): Universitat de Girona
- Sophisticate & Prepare (30 ECTS): Politecnico di Torino
- Execute & Deliver (30 ECTS): Gävle University
- Master's Thesis Master's Thesis: Three Universities and mobility partners Also, the SAR highlights that the added value of offering the joint programme lies in:

(a) profit from the expertise of staff of all participating universities,
(b) follow jointly-taught compulsory courses
(c) learn about manufacturing in Europe within the involvement of the associate partners,
(d) benefit from the mobility offers throughout their studies, and
(e) seek joint-supervision on their master thesis by staff from two involved partner institutions. Furthermore, students will graduate with
(f) an internationally regarded degree that will be a competitive asset on the job market and in terms of their access to graduate studies programmes

These aspects respond to the objectives pursued by both the European Approach methodology and the Erasmus Mundus label.

The panel has in to account that the programme is in a design stage and not implementing yet. The consortium has an Academic Board (AB) were all three Universities are represented, and has attributed functions such as: Keeping a periodic review of the learning outcomes of the programme; Monitoring student achievement and progression; Monitoring and evaluation of the course and follow up actions. Also, it is important the consortium commitment on developing an integrated IQAS once the programme is implemented: *"this review is carried out in an integrated way between the different partners. To this end, an integrated quality management system has been designed, based on the information collected from each of the different systems of each university. A more detailed description of these systems, and especially their integration, can be found in section 9 of this document, specifically in the subsection: Joint internal quality assurance structure."*

However, it is important to include mobility procedures in the integrated IQAS. The procedures and mechanisms have to be defined detailed enough to be understandable and

to assure the transparency to all stakeholders and actors involved. These mechanisms and procedures should set out what is expected of each partner's involvement in the design, implementation and review of the results obtained. It is especially important to establish mechanisms for coordination, monitoring and evaluation of the collaborations of the centres in which the academic placements and final master's theses are carried out.

It is very positive the proposed mechanisms to elect student representatives and administrative representatives will be chosen as a members of each board. According the self report *"each university will choose one of the academic delegates who will participate in the AB. To do this, each university will use the procedures established in its own internal quality assurance systems, guaranteeing that the academic delegate is directly teaching any of the MIMs courses. These representatives will be part of the AB during 4 courses. Each university will choose one of the administrative representatives who will participate in the AB. To do this, each university will use the procedures established in its own internal quality assurance systems, guaranteeing that the chosen administrative has a direct participation in the MIMs. These representatives will be part of the AB during 4 courses."*

According to the added value given by the proximity with the industry it is important the role that will play the Industrial Board, especially in advice, monitoring and feedback.

In relation to mobility, the dependence on funding that comes from obtaining Erasmus Mundus is particularly critical. Students will have to move each semester to the host city of the university offering the module. In the case of the Master's Final Project, students can choose to carry it out in one of the nine research centres. All this implies a high investment in money and time that may dissuade future students.

The different boards and the figure of the module coordinator are spaces for the exchange of knowledge, information on the development of the training programme, etc. In addition, as was stated in different hearings during the visit, the teaching staff involved in teaching share research groups and projects. As it has been explained, it will be very important the development of the content letter of good will and procedures and mechanisms of the future IQAS related with the student progress, mobility to the different institutions, evaluation and Master Thesis development.

Compliant with conditions

Requirements

- To design and implement an integrated IQAS and undertake at least one review of its operation within three years of the programme launch.

Recommendations

- To develop the letter of good will establishing procedures for coordination, monitoring and evaluation of the collaborations of the centres in which the academic placements and final master's theses are carried out.
- To formalise the spaces and procedures to promote exchange of experience.

Cooperation Agreement

The terms and conditions of the joint programme should be laid down in a cooperation agreement. The agreement should in particular cover the following issues:

- *Denomination of the degree(s) awarded in the programme*
- *Coordination and responsibilities of the partners involved regarding management and financial organisation (including funding, sharing of costs and income etc.)*
- *Admission and selection procedures for students*
- *Mobility of students and teachers*
- *Examination regulations, student assessment methods, recognition of credits and degree awarding procedures in the consortium.*

Evidence

Cooperation Agreement

The terms and conditions of the joint programme are clearly laid down in the cooperation agreement.

The agreement covers the following main issues:

a) Denomination of the degree(s) awarded in the programme: Master in Innovative Manufacturing Systems

b) Evaluation of Applications and selection of eligible student it's an Academic Board responsibility. Afterwards, students should enroll of each module in the correspondent University. It is important to note that enrolment can only be done on a full-time basis.

c) Coordination and responsibilities of the partners involved, rests mainly with the Academic Board (AB) where are members the course coordinators on behalf each partner university, two student representative and at least three administrative representatives of each institution. As is listed in the agreement the functions assigned board are:

   i. *Annually agreeing on the admissions target for the programme, for both the target recruitment countries and the EU.*

ii. *Organizing the application process and the selection/admission of students, bearing in mind principles of fair access.*
iii. *Keeping a periodic review of the learning outcomes of the programme.*
iv. *Designing and validating of the content, coherence, and assessment strategy for the programme.*
v. *Performing ongoing curriculum enhancement.*
vi. *Coordinating the language policy and of language learning opportunities.*
vii. *Coordinating the quality control.*
viii. *Ensuring standardization of ICT support.*
ix. *Ensuring mutual recognition (through ECTS) of student performance and achievement.*
x. *Addressing academic and administrative issues about students.*
xi. *Monitoring student achievement and progression.*
xii. *Reviewing feedback from students and coordinating issues and actions arising.*
xiii. *Addressing administrative issues about the organization of teaching.*
xiv. *Keeping oversight of the degree programme handbook.*
xv. *Advertising and performing public relations relating to the programme.*
xvi. *Reporting to the European Commission as required.*
xvii. *Addressing General Administrative and Financial Issues.*
xviii. *Developing protocols for the quality assurance of the award in relation to the requirements of the different national quality assurance frameworks applicable to consortium members.*
xix. Monitoring and evaluation of the course and follow up actions.

Universitat de Girona leads the consortium coordination, that involves general administrative oversight of the programme as well as of its financial issues.

The agreement stablishes an equivalence among different grades used by every partner university. Even though, the agreement gives prevalence to each institution regulation about examination, and the assessment criteria will be established by the university responsible of the module. However, it is important to highlight that AB is responsible to harmonize and agree these criteria.

Finally, mobility is foreseen for students who will be based in the city where the university responsible for each of the modules is located. For teachers, there is no special mention of mobility outside of attending meetings of the different boards.

Assessment

The agreement sets out, in general terms, the key aspects for designing, implementing and developing a joint programme.

However, there are aspects that need to be analysed and specified to ensure that the collaboration is smooth and transparent for all actors involved in the programme, especially for the students.

Firstly, students will have to travel to take each of the modules. However, mobility involves issues that require special attention at the implementation stage, such as the reception at each university and the help or support that each of them will offer. According to that, it is necessary to establish criteria and processes, included in the IQAS, that allow a homogeneous action of the participating universities in order facilitate and speed up student mobility. On the other hand, it would be highly advisable to establish mobility actions for teaching staff to promote the exchange of knowledge and information. The consortium is aware of the importance of all these issues and has committed to: "each university will hire a specific technician to support both the management of the master's degree and, in particular, all the students on it. Said technician will be the main interlocutor with the students."

Secondly, related to the above is the regulations and criteria applicable to examinations. Although AB is the body responsible for harmonising assessment criteria, it would be highly advisable to harmonise or agree on the basic principles of examination regulations (number of sittings, test requirements, review and complaint procedures, etc.).

Finally, as only full-time enrolment is contemplated, it is highly advisable to establish tutoring and support mechanisms for students to ensure that they can achieve the objectives of the degree. It is noted that the agreement states: *"Erasmus Mundus students enroll on a full-time basis. They must attend all classes (lectures and lab classes). Students who have to interrupt their studies for a certain period of time, due to justifiable reasons of health, pregnancy or family matters, must give the consortium coordinator and the local coordinator due notification. All such situations will be evaluated on an individual basis."* While it is good to take into account the possible situations that could happen to a student and could impede the normal development of his or her studies, it is highly advisable to establish methods to prevent the student's progress.

Compliant with conditions

Requirements

To include criteria and processes at IQAS that allow a homogeneous action in order to facilitate and speed up student mobility.

Recommendations

To establish mobility actions for teaching staff to promote the exchange of knowledge and information

To harmonize or agree on the basic principles of examination regulations.

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LEARNING OUTCOMES

Level

The intended learning outcomes should align with the corresponding level in the Framework for Qualifications in the European Higher Education Area (FQ-EHEA), as well as the applicable national qualifications framework(s).

Evidence

SAR shows very clearly how study programme Learning Outcomes (LO) meets the three different national frameworks and the FQ – EHEA.

LO1: Understand the key principles and theories of innovative manufacturing systems.

LO2: Acquire a deep knowledge of the latest technologies and tools used in innovative manufacturing.

LO3: Design, implement, and evaluate manufacturing processes that are efficient, cost-effective, and sustainable.

LO4: Understand the key factors that drive innovation in manufacturing, including globalization, technological change, and market trends.

LO5: Identify and analyse emerging trends and opportunities in the manufacturing sector.

LO6: Understand of the role of collaboration and partnerships in the success of innovative manufacturing systems.

LO7: Understand the importance of quality control, safety, and environmental management in the manufacturing process.

LO8: Apply lean and agile principles to improve the efficiency and responsiveness of manufacturing systems.

LO9: Develop the skills to work in teams in a manufacturing environment, including the ability to motivate and inspire others.

LO10: Effectively communicate and present (technical) information to diverse audiences.

LO11: Understand the importance of ethics and responsible decision-making in manufacturing, including the role of sustainability and corporate social responsibility.

LO12: Conduct research and analysis to identify and solve problems in the manufacturing industry.

Assessment

The MIMS program aligns with the intended learning outcomes at the appropriate level within the Framework for Qualifications in the European Higher Education Area (FQ-EHEA). The program also adheres to the applicable national qualifications frameworks of partner universities in Spain, Italy, and Sweden, which are all consistent with the EQF. Knowledge of a discipline is a key component in these frameworks, and students are expected to demonstrate and apply their knowledge in both professional settings and continuing studies.

The Learning Outcomes highlight the importance of:

- Gathering and interpreting relevant data
- Working in complex and specialized contexts
- To be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences, learning skills
- Innovation and creativity stand out as added values.

During the on line visit, teachers and managerial team given different approaches and interesting events and past experiences fostering innovation, like participation in iFest Dream Big Challenge Innovation in Barcelona. Also, their stress the monitoring of student progress as tool to help to develop these values. However, there is a need for a definition of what both terms include in the training programme.

Compliant

Recommendations

Define and deploy at Materia level innovation and creativity LO.

Disciplinary field

The intended learning outcomes should comprise knowledge, skills, and competencies in the respective disciplinary field(s).

Evidence

The self-assessment provides a comprehensive analysis of the state of the industry's needs at European level. This analysis is bases on the results of the *European Manufacturing Survey (EMS).* Also, at the document "EMS support and coordination mechanisms for MIMS" is said: *"The European Manufacturing Survey (EMS) covers a core of indicators on the*

innovation fields "technical modernisation of value adding processes", "introduction of innovative organisational concepts and processes" and "new business models for complementing the product portfolio with innovative services". The questions on these indicators have been agreed upon in the EMS consortium and are surveyed in all the participating countries targeting manufacturing companies with more than 20 employees.

It is important to take into account the objectives of the study programme:

- To assert Europe as a point of reference for higher education and research in the field of innovative manufacturing systems by training a comprehensive and excellent master course, aligned with the complex needs of the manufacturing industry.
- To prepare future professionals to strategically manage and execute sustainable and effective decisions as experts working in manufacturing industries.
- To train future researchers in the field of innovative manufacturing systems with a robust methodological and theoretical understanding of the underpinning values, disciplines, approaches, and paradigms of the manufacturing research.
- To provide future professionals with an integrated knowledge of the dynamics of innovative manufacturing development (sustainable design, process, and valuation), environmental issues, the role of cultural diversity, and creativity to innovate.
- To foster and enhance strong international relations between all MIMS partners. These relationships will put in contact all academic, research, and industry areas. These exchanges of knowledge and expertise will benefit Europe and Third countries.

Assessment

Even the objectives and learning outcomes are based in an analysis of a strong evidence as EMS. It is recommended to deploy them being more specific about knowledge, skills and competences of the new generation of engineers trained through MIMS, could be offered here, even if in general terms.

Compliant

Recommendations

To deploy objectives and learning outcomes being more specific about knowledge, skills and competences.

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Achievement

The programme should be able to demonstrate that the intended learning outcomes are achieved.

Evidence

SAR - Annex III provides a depth explanation of the learning outcomes and the evaluation system of each course. The four course sequences are designed for the learning outcomes progressive achievement, all courses are compulsory :

Module 1: Ideate & Initiate

Learning outcomes: LO1 to LO12

Subject	Main Aim	Assessment	Learning Activities
P1. InnoStart: Navigating the initial phases of innovation	To develop a comprehensive understanding and practical skills for identifying, evaluating, and executing **new innovation** opportunities through effective market research, **idea generation**, and business modelling. A special focus will be taken with the specificities of the manufacturing sector.	Oral presentation Group assignment Study /Analysis /Case study resolution Other assignments	Lecture class Interactive class Study/Analysis/Case study resolution Computer lab class Seminar Report, assignment, task (individual /group) Text reading and commenting
P2. Strategic management in manufacturing	To provide students with learning about the analysis, formulation, and implementation of strategies, to achieve the organizational goals, satisfy customers and other stakeholders, in response and anticipation of the environmental conditions, and developing the available organizational resources and capabilities. Strategic management provides direction to an organization and involves setting objectives, developing plans and policies, **including innovation**, to achieve such objectives. A special focus will be taken with the specificities of the manufacturing sector.	Oral presentation Group assignment Study /Analysis /Case study resolution Other assignments	Lecture class Interactive class Study/Analysis/Case study resolution Computer lab class Seminar Report, assignment, task (individual/group) Text reading and commenting
P3. Design of operations management systems	To provide students with knowledge to design business processes in services or in manufacturing by learning how to increase productivity and deliver higher quality standards. This includes the proper management of materials, machinery, technology and labour to produce high-quality goods and services that will benefit the company. Key concepts include understanding the role and contribution of	Exam Group assignment Presentation/Delivery/ Exercise solving	Lecture class Exercise solving Study/Analysis/ Case study resolution Computer lab class

	the operations design management function, effective resource management process analysis, bottlenecks, flows rates and inventory levels.		
P4. Design for prototyping	To provide students with knowledge to design parts combining process knowledge, computational design tools, and application requirements, having the ability to use the technical skills and traditional and modern engineering tools. It involves the definition of the main functional requirements of a product or idea that should be prototyped considering realistic constraints as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. Selection of process parameters and properly use of 3D printers are also aim of the subject.	Group assignment Individual assignment Study/Analysis/Case study Presentation/Delivery /Exercise solving	Lecture class Interactive class Study/Analysis/ Case study resolution Computer lab class
P5. Advanced manufacturing	To provide students with knowledge to differentiate among different advanced technologies. For that it will be used the broad technical training necessary to understand **the impact of innovative technologies** in a global, economic, environmental, and societal context. This subject will also consider the use of theoretical knowledge in job shop environments with real machines for decision making.	Exam Group assignment Study/ Analysis/ Case study Oral presentation	Lecture class Interactive class Study/Analysis/Case study resolution Computer lab class

Module 2: Sophisticate & Prepare **(LO1 to LO12)**

Subject	Main Aim	Assessment	Learning Activities
P1. Additive manufacturing systems and materials	The subject is aimed at providing an overview of the state of the art of additive manufacturing (AM) with specific reference to processes and materials. The objective of the lectures is to offer a general introduction to AM technologies, but also to explain the reasons behind their worldwide diffusion in various industrial sectors (such as the aerospace, automobile and white engineering sectors) and in other sectors (such as the biomedical and jewellery sectors). As regards materials, the subject aims to supply the student with knowledge concerning materials suitable and developable through AM technologies. Starting from the engineering background about materials acquired in the previous modules, this subject will supply the basic understanding of materials for AM to optimize their exploitation by **using these innovative technologies**, also considering the design requirements of different applications.	Exam Final report, assignment	Lecture class Practical class

	As concerns AM systems, the AM cycle will be analysed, the techniques will be classified, and the main application fields will be illustrated. The AM techniques that are currently available on the market will be described in detail together with their advantages and drawbacks. Fundamentals of Design for AM will be supplied to the student for the development of the subject practice.		
P2. Sustainable manufacturing	This class aims to provide the conceptual basis and the **methodological approaches related to Sustainable Manufacturing**, from the guidelines to the tools for the performance analysis of a manufacturing system. This knowledge, together with the classical tools for the evaluation of efficiency, effectiveness, and economy of a production system, will be necessary for the implementation of **decision-making strategies towards the sustainable production**. The teaching of such tools is completed by some examples of application in real industrial cases.	Exam	Lecture class Practical class
P3. Quality and metrology	The course provides the skills to analyse in detail the important aspects of Quality Management Systems related to companies/services. Stimulating student awareness of the concepts of Quality of a product/ service and competition-oriented design Presenting a structured framework of the Italian Quality System and the accreditation and certification activities Describing the main techniques of Process Control and Acceptance Monitoring in the acquisition phase of semi-processed/raw-materials and during the introduction on the market of end products/ services Stimulating capabilities of design and verification of the entire supply chain, starting from the market demand analysis, up to the policies of outsourcing/insourcing of facilities and support structures.	Exam Group assignment Oral presentation	Lecture class Practical class Seminar Study/Analysis/ Case study resolution
P4. Flexibility automation and collaborative robotics	The course provides insight into the objectives and strategies of the novel manufacturing paradigms (Industry 4.0 and 5.0). In addition, this course focuses on how robots can be effective teammates with other robots and human partners. Concepts and tools will be reviewed for characterizing task objectives, robot perception and control, teammate behavioural modelling, inter-agent communication, and team consensus.	Exam Group assignment	Lecture class Practical class Study/Analysis/ Case study resolution

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Module 3: Execute & Deliver

(from LO1 to LO12).

Subject	Main Aim	Assessment	Learning Activities
P1. Logistics and supply chain management	To provide students with knowledge of strategies and principles for effective and efficient logistics and supply chain management, both in theory and in practice.	Individual assignment Group assignment Final report, assignment, etc.	Lecture class Practical class Exercise solving Text reading and commenting Seminar Tutoring
P2. Innovation management	To provide students **with knowledge of innovation management methods**, models and challenges, and how **innovation processes** and methods can be implemented, used and managed in industrial companies and organisations.	Written examination Assignments and seminars Course paper	Lecture class Study/Analysis/Case study resolution Seminar Computer lab class Text reading and commenting Report, assignment, task (individual/group)
P3. Reliability and safety	To provide students with knowledge on how to measure, design, manage and optimize three important quality elements of products or systems: reliability, maintainability and safety.	Group assignment Final report, assignment Individual assignment	Lecture class Practical class Exercise solving Text reading and commenting Seminar Tutoring
P4. Circular business models and sustainable logistics	To provide students with knowledge on circular business models and how they have been applied in supply chain context	Exam Individual assignment Final report, assignment	Lecture class Practical class Seminar Study/Analysis/Case study resolution Tutoring Text reading and commenting

Module 4: Master's Thesis

Subject	Main Aim	Assessment	Learning Activities
Master's Thesis	This module is designed to build on students' knowledge and prior learning gained during the previous modules of the Master programme Students will investigate, **design and evaluate complex innovative manufacturing challenges** They will **creatively devise, implement, and evaluate robust, adaptable**, ethical and sustainable solutions for manufacturing challenges	Project assessment	Project work

*At the **Document of strengths,** there is a reference of creativity:*

Contents: Innovative in CONTENT

- *Simulation of the innovation journey from creativity to business model*
- *Content about latest technologies and new form of work organization*
- *Relevant and recent scientific and practical developments Innovative in METHOD*
- *Active, proactive and participative training method*
- *Combination of class activities with outdoor events*
- *Challenge-oriented group projects and assessments*

Assessment

Firstly, it should be borne in mind that the object of evaluation is the design of a new degree programme, so there is no evidence of the results obtained. Therefore, the assessment is based on the planning of the courses and their coherence in order to obtain the learning outcomes. In any case, at this early stage of the design of the degree, it is difficult to assess whether certain learning outcomes related to creativity and innovation will be achieved. The learning outcomes of the program are distributed across different courses, obtaining a homogeneous distribution of the outputs for students. Overall, there is an appropriate correlation between courses and learning outcomes. As it said above, innovation and creativity are key values, in the "strengths" document are described contents that should be incorporated in a clear way in each of the subjects:

In next case it is important to explain the deployment of this journey through all modules.

- *Simulation of the innovation journey from creativity to business model.*

It could be very helpful to stand which research resources, research groups and relevant stakeholders will be taken part of this *think tank,* possibly Industrial Board:

- *Content about latest technologies and new form of work organization.*

It should be interesting to stablish how recent developments, described next, are spread through the three universities and 9 internship partners

- *Relevant and recent scientific and practical developments Innovative in METHOD.*
- *Active, proactive and participative training method*
- *Combination of class activities with outdoor events*
- *Challenge-oriented group projects and assessments*

Secondly, it is important to highlight that the added value of this programme is the focus on creativity and innovation. For this reason, it would be advisable to incorporate cultural, gender, functional and social diversity in the development of the programme, both in the contents and in the learning activities in a clearer way.

Thirdly, the SAR explains that*: "the training will focus on specific key areas such as: additive manufacturing, advanced logistics and sustainability, collaborative robotics and industrial metrology and quality. Through practical and laboratory activities at the Mind4Lab infrastructure at DIGEP (https://www.digep.polito.it/en/focus/dipartimento_di_eccellenza_project) (Dipartimento di Ingenieria Gestionale e della Produzione) as well as numerical modelling and simulation activities, students will develop theoretical and practical know-how and special skills for running and managing complex production systems."* The External Assessment Committee strongly recommends to deploy all these learning activities in the different subjects.

Finally, the fact all courses are compulsory makes easy to monitor every student development, but can be interesting to introduce some elective subjects to bring the opportunity to access a deep knowledge in specific skills.

Compliant

Recommendations

To describe how the innovation journey is deployed through all modules.

To stablish communication channels with universities and partner institutions spread recent developments.

To deploy learning activities related to numerical modelling and simulation activities.

Regulated Professions

If relevant for the specific joint programme, the minimum agreed training conditions specified in the European Union Directive 2005/36/EC, or relevant common trainings frameworks established under the Directive, should be taken into account.

Evidence

This standard is not relevant for the assessment of this master's programme

Assessment

This standard is not relevant for the assessment of this master's programme

Compliant

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STUDY PROGRAMME

Curriculum

The structure and content of the curriculum should be fit to enable the students to achieve the intended learning outcomes.

Evidence

SAR stablish the next statements:

A) MIMS is a two years course of 120 ECTS. Every module of 30 is delivery by one of the partners institutions, *The programme structure foresees in the context of its three modules: "Ideate & Initiate", "Sophisticate & Prepare" and "Execute & Deliver" to introduce the students to the complete innovative manufacturing systems: from ideation of a new product to delivery. Also, the courses, in each one of the modules are organized according to this principle.*

B) The fourth module is the Master Thesis and the student can choose where to develop it: *"Students will have the possibility of choosing either one partner University (UdG, PdT or HiG) or one associated partner (in this case, one of the three partner Universities will monitor and tutor the master thesis together with the associated partner) to develop the Masters' thesis. It is noted that the associate partners will include some of the 14 associated partners in 11 countries participating in the EMS consortium (European Manufacturing Survey), allowing students to choose from a very wide range of possibilities for the MT elaboration. At this stage, 9 of them have been confirmed, but the consortium is working with the objective that the students are able to develop their Master's Thesis in any of them*."

C) About culture integration: *"students broaden their language capacity, by learning another language next to their own mother tongue and English (Language)."* Also, further on, it is said: *"The academic-practice- balance of the programme is key to provide students with both academic and transversal skills. Mobility, between the different partners, are also key elements of the teaching and learning experience in the programme. Students acquire key skills, linked to the learning outcomes."*

D) Creativity and Innovation Values: "*Students will be familiarized with innovative manufacturing as a multidisciplinary field, based on the input of several key disciplines. This multidisciplinarity is paired with research skills, which enable students to carry out their own research based on different methodological and disciplinary research traditions and explicitly trained in different courses."*

Assessment

The curriculum is structured according to study programme objectives, it is a two year program divided into four semesters. This creates a well-defined training path that simulates the complete innovation journey, ensuring students acquire the necessary knowledge and progress to achieve the intended learning outcomes.

The MIMS program's curriculum is designed to enable students to achieve the intended learning outcomes. These outcomes, along with the program's aims and objectives, serve as reference points for shaping the curriculum's structure and content.

However, in line with the objectives and key values to be achieved, innovation and creativity, it would be very appropriate to better prepare students for diverse industries and evolving technology, consider including interdisciplinary topics that expose them to areas such as data analytics and IoT (Internet of Things). To offer elective courses or specialization tracks that allow students to tailor their studies according to their interests and career aspirations within the manufacturing and industrial systems domain.

Finally, one of the main objectives of a join programme is to integrate values of cultural and social diversity, learning diversity, language, for this reason it could be an opportunity to integrate more clearly these values in programme curricula.

Compliant

Recommendations

Include values associated to cultural and social inclusion, learning diversity at the study programme. It may be interesting to include elective subjects.

Credits

The European Credit Transfer System (ECTS) should be applied properly and the distribution of credits should be clear.

Evidence

SAR stablish that every MIMS is a 120 ECTS study programme divided in 4 modules of 30 ECTS. The ECTS distribution by subjects is as follows:

Modul 1 Ideate & Innovate 30 ECTS – Universitat de Girona

InnoStart: Navigating the initial phases of innovation – 6 ECTS

Strategic management in manufacturing – 6 ECTS

Design of operations management systems – 6 ECTS

Design for prototyping 6 ECTS

Advanced manufacturing 6 ECTS

Module 2 Sophisticate & Prepare 30 ECTS - Politecnico di Torino

Additive manufacturing systems and materials 6 ECTS

Sustainable manufacturing 8 ECTS

Quality and metrology 8 ECTS

Flexibility automation and collaborative robotics 8 ECTS

Module 3. Execute & Deliver 30 ECTS Gävle University

Logistics and supply chain management 7.5 ECTS

Innovation management 7.5 ECTS

Reliability and safety 7.5 ECTS

Circular business models and sustainable logistics 7.5 ECTS

Module 4 Master's Thesis Master's 30 ECTS Any of the three award-degree Universities and in any of the mobility partner

Assessment

The MIMS program correctly employs the European Credit Transfer System (ECTS) over the course of two years, with a total of 120 ECTS credits. The program is divided into three compulsory modules (each worth 30 credits) and a master's thesis (worth 30 ECTS). Although subjects have a different assignment of ECTS is it coherent with the learning activities, contents and learning outcomes to achieve.

The coordinating institution is responsible for conferring the award as appropriate.

Compliant

Workload

A joint bachelor programme will typically amount to a total student workload of 180-240 ECTS-credits; a joint master programme will typically amount to 90-120 ECTS-credits and

should not be less than 60 ECTS-credits at second cycle level (credit ranges according to the FQ-EHEA); for joint doctorates there is no credit range specified.

The workload and the average time to complete the programme should be monitored.

Evidence

SAR establish a different units to measure ECTS:

Universitat de Girona 25 to 30 h per 1 ECTS

Politecnico di Torino 25h per 1 ECTS

Gävle University 27h per 1 ECTS

Assessment

MIMS is a 120 ECTS full time master's programme. It is adequate and also the effort for each ECTS (25-30 hours, with a total amount of 1.500-1.800 hours of work per year, according to the three universities' constraints) and for the Master Thesis (a common workload of 750-900 hours/30 ECTS). As it is explained above the panel considers that the size of the programme is in line with the study load is spread equally over the two years. The programme has put in place two different mechanism so monitoring. At a strategic level, the Academic Board every semester coordinates through course directors (representatives of each university) function such as: Ensuring mutual recognition (through ECTS) of student performance and achievement; Monitoring student achievement and progression. At an operational level, course directors reports to AB every semester about the workload department.

Compliant

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ADMISSION AND RECOGNITION

Admission

The admission requirements and selection procedures should be appropriate in light of the programme's level and discipline.

Evidence

Cooperation Agreement and SAR stablish:

a) **Academic profile required**:

The applicant must hold at least a B.Sc. degree having obtained at least 180 ECTS (or equivalent, i.e., completion of at least 15 years of previous education including a minimum of 3 years at University level)

- *Excellent results leading to their degrees (180 ECTS EQF level 6), which should be in either: Industrial Engineering, Business Management, Robotics, Electrical or Mechanical Engineering, Physics, Mathematics or other degrees with similar basic subjects.*

Prepare the required documents, to be submitted:

- *1. Letter of application outlining the rationale for wanting to enroll in the program (letter of motivation).*
- *2. Curriculum Vitae.*
- *3. Scan of University Bachelor Degree or equivalent with records transcript (English translation)* – if the BSc has not been awarded by the application deadline, the student must provide a certificate proving that he/she is registered in the last year of the BSc program.*
- *4. Proof of level of competency in English.*
- *5. Scan of a valid ID document and/or Passport.*
- *6. Digital Passport-type photograph.*
- *7. Names of two referees and their addresses, preferably from the University or Institute that awarded the first degree, who will be contacted by the consortium and will have to submit one letter of recommendation each.*

b) **Level of languages required**:

B2 level of English

c) Enrolment procedure:

The consortium seeks to deliver the programme in the spirit of one European "virtual university", with a high level of collaborative work in the delivery of teaching and of learning support.

Students will be enrolled at the UdG at the beginning of the programme, at the PdT on the second semester and at the HiG on the third semester respectively. During the fourth semester, students will be enrolled in PdT.

Enrolment will involve signing and accepting commitments to statutes, ordinances, regulations and rules of these institutions.

In case a student, even if admitted by the Consortium, does not meet those requirements, the partner institution reserves the right to reject his/her enrolment.

*d) **Fees***

The participation costs for the two-year course will be 9.000 € for UE students and 14.000 € for non-UE students.

Although students will decide in which of the different partners or mobility partners will develop their final project, students will be enrolled in PdT. The final project will be defended in any of the three partners institutions.

The official full student record, including records of qualifications on admission and credits obtained and transferred from one member institution to another and contributing to the award of the degree, will be maintained by the Coordinating institution.

Assessment

Admission is well described and adequate. Previous skills are detailed. Language considerations are well described. The consortium has stablished the number minimum of student 18 and maximum of students allowed will be 25. This gap determines the sustainability of the programme. However there are some issues that should be addressed during the implementation stage.

On one hand, there evidences show that the actual teaching staff has an adequate level of writing English they used to produce academic papers or attending study programs in this language. But to teach in a foreign language is necessary to have special skills and knowledge of the use of the language. Also, taking in to account that external teachers (professionals, researchers, etc) will deliver conferences, seminars, etc, it will be highly recommended to stablish a minimum of criteria to teach and also to stablish support to

teachers to help them to achieve the criteria. Finally, it will be very valuable to provide support for students to reinforce their English language skills.

On the other hand, the documents required for admission include a letter of motivation outlining the rationale for wanting to enrol in the program, a curriculum vitae, a scan of university Bachelor Degree or equivalent with records transcript, proof of level of competency in English, scan of a valid ID document and/or Passport, digital passport-type photograph, and names of two referees. The selection procedure for admission is based on applicants' academic records that reflect theoretical knowledge of manufacturing engineering and business management. Priority is given to students who can certify they meet the admission requirements established by the consortium formed by the three universities and governed by the European Union policy related to the Erasmus+ Joint Masters Degrees programs. Anyway, the consortium should stablish and make clear and transparent a set of criteria for assessment of applications. The weight of each single submitted document should be at least mentioned: CV, motivation letter, academic grades, publications/patents related to the topic, etc.

Also, taken into account that innovation and creativity can be foster by the diversity of cultures, it could be interesting to design mechanisms to attract students from regions different from Italy, Sweden and Spain.

In relation to the enrolment process, it is established that each of the universities will be responsible for the enrolment of the modules it teaches. It could be a critical handicap for students in terms of time and administration burdens if the procedures of each institution are not homogeneous. It is highly critical when students has to move every semester to a different country which means that in a short space of time they must search for and contract accommodation and, in some cases, carry out the necessary procedures to obtain legal documentation (visas) or health documentation.

Compliant

Recommendations

There is a new evidence with the level of English of teachers. Nevertheless, it is not clear the requirements to determine if this English level is enough.

To establish and to provide support for students to reinforce their English language skills.
To revise the selection criteria and documentation required.

To establish mechanisms to attract students from regions different from Italy, Sweden and Spain, in order to increase innovation and creativity.

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Recognition

Recognition of qualifications and of periods of studies (including recognition of prior learning) should be applied in line with the Lisbon Recognition Convention and subsidiary documents.

Evidence

SAR

In line with the Lisbon Recognition Convention, students can apply for an exemption from a course, given previous studies and/or work experience. MIMS will accept two major categories of exemption:

A. *Exemption based on Recognition of Prior Qualifications: In this case, the exemption is requested based on programmes or courses that students have completed successfully before.*

   The procedure is based on certificates that can prove the student succeeded in a certain programme or course.

B. *Exemption based on Recognition of Prior Learning: The exemption is in this case requested based on experiences outside of the education system. The procedure requires a greater commitment as it implies interviews and an assessment.*

   If applications are consented by the Academic Board, consideration of previous studies or work experience will be taken place in accordance with the procedures established at the university (UdG, PdT or HiG), which is responsible for providing the concerned course(s).

Assessment

The lack of a homogeneous process and criteria for all universities can result in unfair situations and a lack of transparency. Attending the general information given in the SAR about recognition it is important to be more concrete: examples for evidences for professional experience or prior learning recognition, minimum of professional experience (years, months, etc), in which fields of industry. Academic Board is responsible for assessing the recognition, it would be necessary that it is also responsible for the procedure

Finally, it would be opportune to establish about the kinds of formal qualifications or non-formal and informal learnings will be considered for exemptions.

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Compliant

Recommendations

To define the limits of professional experience or prior learning recognition.

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LEARNING, TEACHING AND ASSESSMENT

Learning and teaching

The programme should be designed to correspond with the intended learning outcomes, and the learning and teaching approaches applied should be adequate to achieve those. The diversity of students and their needs should be respected and attended to, especially in view of potential different cultural backgrounds of the students.

Evidence

Document strengths:

Opportunities

- Multidisciplinary approach to innovation
- Variety of labour insertion opportunities
- Possibility to connect with different cultures and have a unique learning experience
- Access to (industrial) PhD
- Meet the challenges of the manufacturing sector by working on real projects

SAR

- **Master Thesis,** *(How to choose a supervisor and co-supervisor)*

  "After the selection of thesis topics, students will be assigned to a thesis supervisor and co-supervisor."

- **Learning activities**

  "The academic-practice-balance of the programme is key to provide students with both academic and transversal skills."

Document TAP (Tutorial Action Plan)

" Objective 2: In addition, into the same session will be introduced, some of the main academic concepts that will be worked on during the module. Specifically, in the first module they will be developed aspects related with "Creativity and innovation", in the second one "Team working " and the third on "Project leadership". This general introduction, using "role games" when it is possible, will allow students immerse into it from day one in the overall objective of the module."

Assessment

The MIMS programme is designed to correspond with the intended learning outcomes, and a variety of learning methods and teaching approaches are used to ensure that these outcomes are achieved. These include lecture classes, practical classes, seminars, exercise solving, study/analysis/case study resolution, computer lab classes, report/assignment tasks, interactive classes and text reading and comprehension. The programme also takes into consideration the diversity of students and their needs, including potential different cultural backgrounds, through diversity enabling teaching which allows students to build on their own individual difference, experience and background.

Nevertheless, there is little reference on how the diversity of students and their needs would be respected and attended to, especially in view of their potentially different cultural backgrounds.

Although the panel is aware that the programme is in a preliminary stage of design, it is very important to specify in the different subjects how are going to be trained transversal skills and especially the competence in creativity are going to be worked on. During the site visit the panel could observe that the approaches to creativity were diverse and sudden gave the perception that there is a lack of coordination and mechanisms to implement learning activities to enhance, monitoring and assess creativity. In the same way, it is very important to specify how computational skills are going to be trained and also assess. The panel considers positive that TAP will introduce to students the concepts innovation and creativity at the first stage of the study programme, but is vital that this concepts are shared among teaching staff.

Finally, it is recommended to include more information on how the diversity of students and their needs would be respected and attended to, especially in view of their potentially different cultural backgrounds. It is important to make clear, how is this diversity is beneficial for the program.

Compliant

Recommendations

To define and stablish the approach (learning activities, contents, assessment) to creativity and innovation.

To specify how computational skills are going to be trained and assess.

To include more information on how the diversity of students and their needs would be respected and attended.

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Assessment of students

The examination regulations and the assessment of the achieved learning outcomes should correspond with the intended learning outcomes. They should be applied consistently among partner institutions.

Evidence

SAR

"through the development of the Master Thesis all students will work in these aspects:

- *Developing abilities to define relevant research questions and conduct scientific analysis by integrating knowledge from several key areas related with innovative manufacturing systems.*
- *Applying relevant theories and methods in a profound manner and critically reflecting upon the applied theories, methods, and empirical material forming the basis for the analysis*
- *Analysing and critically assessing relevant existing approaches, concepts and research related to the thesis' research questions.*
- *Constructing strategies for solutions related to the specific research questions.*
- *Evaluating results and discussing implications*
- *Providing written and oral academic presentations of the research topics, methods, and conclusions."*

"The analysis of curriculum/course evaluations, the analysis of student pass/failure rates, etc.). It will specifically look into the following aspects:

- *Monitoring and guaranteeing a mix of different evaluation forms*
- *Monitoring the coordination between the learning outcomes and the study programme. The Academic Board guarantee that students can achieve the set goals on the basis of the programme .*
- *Monitoring the coordination between the learning outcomes and evaluation forms*
- *A well-balanced study load, both over the semesters and across courses offered in the programme."*

"Especially learning outcomes 1, 2, 3, 4, 5, 6, 7, 8 and 9 are the main learning goals which are met by lectures. Next, there are seminars, in which the amount of interaction between professor and student is enhanced, and where professors discuss and analyse with students the course contents. This guidance can take different forms: guidance during exercises;

support for individual assignments; discussion between students and professors; discussion of assignments. The seminar can be practice-oriented or theoretically based and is normally used for smaller groups of students. This form of instruction aims at achieving learning outcomes 2, 4, 5, 6, 9, 10, 11 and 12."

Assessment

The examination regulations and the assessment of students are defined and monitoring by the Academic Board, on the basis of the Consortium Agreement. The Academic Board guarantee that students can achieve the set goals on the basis of the programme and will monitor the coordination between the learning outcomes and evaluation forms. The programme regulations, based on the agreed Consortium Agreement, will foresee that the examination for each course is organized by the partner where the course is offered and will be in accordance with the common regulations and quality standards adopted by the Academic Board. The Degree Awarding University who is coordinating the course is the responsible for organizing the evaluation and the assessment of the achieved learning outcomes should correspond with the intended learning outcomes and be applied consistently among partner institutions

It is required that mechanisms be established to ensure transparency and fairness in the assessment of the final master's thesis. These mechanisms should clearly indicate the level of demand in terms of competences, skills to be acquired and other basic elements. In this way, it is ensured that the teaching staff responsible for tutoring these projects share and apply the same criteria. Currently, there is a Module Director who is responsible for monitoring and ensuring that the criteria are applied. The Academic Board has committed to design master thesis rubrics before the programme will be implemented. Also AB will be responsible to follow up.

Compliant

Recommendations

To follow up the Master Thesis rubrics implementation.

To stablish English Language support services to students.

To implement continuous assessment methods.

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STUDENT SUPPORT

The student support services should contribute to the achievement of the intended learning outcomes. They should take into account specific challenges of mobile students.

Evidence

Document of *MIMS strengths*

"Weaknesses

- *No previous MIMS edition*
- *Administrative burdens for students (language)*
- *Numerous jobs-to-be done by students before arrival (visa, insurance, accommodation, travel, etc.)*
- *No previous experience of the three partners as a consortium*
- *Initial difficulty to understand local language and culture*
- *Challenging diversity management"*

Document of *MIMS TAP (Tutorial Action Plan)*

"The TAP is considered taking into account certain characteristics of the students:

- *Academic diversity of the students, mainly in training, previous degree, study field*
- *Diversity of cultural profiles, mainly with respect to the country of origin*
- *Other personal diversity such as motivations, goals, interests, abilities and limitations, to mention a few*

OBJECTIVES

The TAP consists in a set of actions that intend to guide the students in their process of learn in order to achieve various objectives:

- *Increase the degree of satisfaction with the whole formative process*
- *Encourage the student to self -regulate their own learning process*
- *Prevent dropout, above all in the Master's Thesis phase*
- *Ensure the achievement of master's learning outcomes, especially in the subject of the Master's Thesis*

TAP Main objective Month approximate Organizer

TAP 1 Creativity and innovation September (1st year) University of Girona

TAP 2 Team working January (1st year) Politecnico di Torino

TAP 3 Project leadership September (2nd course) University of Gävle

TAP 4 Master thesis follow up January – June (2nd year) University of Girona, Politecnico di Torino, University of Gävle

TAP 5 Needs and goals – individual tutoring sessions All the course University of Girona, Politecnico di Torino, University of Gävle"

"The first three TAP (TAP1-TAP3) activities will have two types of objectives.

- *Objective 1: First a student support goal that will enable the student to enter the University where every module is developed, as well as knowing all the additional services (library, sports, special needs students, etc.) so that their integration into the new environment be made as smooth, natural and effective as possible."*

"The TAP 4 activity's main objective is the continuous monitoring of the development of the Master's Thesis."

Finally, the TAP 5's main objective is the individualized follow-up of each student. Not only to detect academic issues, but also personal situations that hinder their integration and learning.

This will be the main way of detecting students with special needs (disabilities, economic, social, and others) so that they can be referred and oriented, if necessary, to the specific services of each university."

Document MIMS Diversity support

"Through the Tutorial Action Plan (TAP), specifically the action "TAP 5" (Individual assessments' needs), the UdG will detect all those situations that may influence in the learning capacities of each individual student: cultural diversity, economic situation, visual impairment, mental disorder, autism spectrum disorder, to mention just a few."

SAR opportunity to learn other languages

"In addition, although the language of instruction will be English, all the students will have the possibility to learn partner country's languages, and therefore enhance their integration into these cultures. In consequence, as an added-value of doing an international Master's degree in a foreign country, during each of the semester students will also be encouraged to take a Spanish, Catalan, Italian and Swedish language course

Moreover it is said:

Last but not least, students broaden their language capacity, by learning another language next to their own mother tongue and English (Language)."

About different accommodation services in each University:

"Student accommodation

The University of Gävle does not provide any student accommodation. Even though the university doesn't have any accommodation to offer, there are several paths to finding comfortable and safe place to live during the studies."

Assessment

Pre-arrival & Upon arrival

According to the MIMS proposal, the student support services should contribute to the achievement of the intended learning outcomes. The consortium should take into account the specific challenges of mobile students, such as the coordination between the learning outcomes and the study programme, providing a well-balanced study load, and providing courses to learn the local language.

Services are clearly identified and functions are well defined, without overlapping. This allows the Student to know who they must attend to in case of a doubt/problem.

Since students will have to move every 6 months, it is of vital importance to manage well their accommodation and administrative burdens. In this sense, there are some issues that should be clear in prior information to future students, before study programme starts. It should be clear for every student who is the person o service in every institution in accommodation and administration matters. That is very important specially for students coming from countries other than Italy, Sweden or Spain.

It is positive that the consortium is aware of that and pointed out as a weakness. In addition, it is expected that each university will hire a technician who will be in charge of these issues. It should be highly recommended to set up procedures and mechanisms to be more agile and transparent. Although, in TAP document is said that each University will do an initial welcoming session to show facilities and services is necessary to strength the welcoming procedures such as: assigning local tutor, to create channels of communication among students (new, current and alumni) where they help each other, design guides with main information for new students about city, administrative issues, main services and contact details, etc.

Also, the panel considers highly recommended that Master Thesis topics would be considered by students from the very beginning of the first course. In this sense, it is important that students are aware of the role played by institutions that join the Master.

Other services

As was explained during the visit, the MIMS programme is eligible for funding under the Erasmus Mundus label to cover the costs of the planned mobility.

At is said above in-house services seem excellent for all universities. From the TAP information it follows that the student will have access to all the services and facilities of

each of the universities. SER includes a clear mention of the commitment of these institutions to make available to students of the master all the resources they need.

It is very positive the coordination role of AB with student members, it is very important the coordination between students, staff and interested companies, for Master Thesis and employability.

Also, the close relationship between the MIMS consortium and the consortium that develops and carries out the *European Manufacturing Survey* (EMS) survey is very positive and could become an important added value. It is important that nine of the institutions involved in the EMS consortium are partners where students could develop their Master Thesis. These nine institutions are located in different countries from the three universities of the consortium, which increases the possibilities of mobility and the need for coordination processes and mechanisms that guarantee the minimum impact on the development of the thesis.

Finally, it is important to note that the value of respecting and integrating diversity is key in joint programs. In the evidence provided, SAR, tutorial action plan document and diversity support document, special emphasis is placed on the possibility of language learning, but it is important to incorporate mutual learning of cultural, social, gender, learning, etc. diversity. In relation to learning diversity, Univesitat de Girona as a coordinator institution is the responsible to asses it and establish the actions need to guarantee the student success. However, it is important to establish channels of communication between the different teaching support services of the different universities and institutions involved.

Compliant

Recommendations

The following recommendations should be the subject of special analysis within three years of the start of the degree:

To establish and follow up the procedures and information to avoid administrative burdens, accommodation and mobility issues.

To follow up the implantation of a technician interlocutor with students in each university.

To strength the welcoming procedures and guides for welcoming, to create channels of communication among students.

To start Master Thesis topics be considered by students from the very beginning of the first course and inform them about the role played by institutions that join the Master.

To stablish communications channels and procedures with universities and the 9 institutions to minimize mobility issues and assure the same assessment criteria.

To establish channels of communication between the different teaching support services of the different universities and institutions involved.

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RESOURCES

Staff

The staff should be sufficient and adequate (qualifications, professional and international experience) to implement the study programme.

Evidence

SAR. CVs of the teaching staff

Assessment

Teaching staff is made up of 19 people, 6 of whom are full professors and 10 associate professors. Most of the staff holds PhDs and possesses a relevant h-index, indicating that are active in the production of publications. However, as explained in this report, it is necessary to know the maximum number of students expected in order to be able to assess the sufficiency of the teaching staff.

However, there is a strong need to address the currently gender balance (7 women).It is very positive that Universitat de Girona will provide with experts from its Gender Equality Unit to address possible issues would arise during implementation phase. But also, it is very important to be proactive and design an action plan and criteria to prevent them.

Finally, the consortium should stablish a minimum of level of English for all teaching staff. Although teachers have used the English language in their research work to teach, fluency in language and mastery of oral expression are important. As has been already said, even there are evidences that shows that actual teaching staff have experience in English environment, it is highly recommended to define and stablish criteria and support actions when it is needed to accomplish an adequate skills for teaching in a foreign language.

Compliant

Recommendations

Need to design and establish criteria to address and assure gender balance.

Need to establish criteria of level of English.

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Facilities

The facilities provided should be sufficient and adequate in view of the intended learning outcomes

Evidence

SAR stands the following specific facilities for MIMS

"The University of Gävle and the Faculty of Technology and Environment:

- *The Human Lean Centre is a workshop for simulating and applying Lean methodologies and practices. It is also used for studies of manufacturing, logistics and ergonomics.*
- *Computer Labs focused on reliability and simulation modelling for operations management.*
- *CAD and statistical programmes.*
- *The University Workshop and Open Lab/Maker Space*
- *workshops for mechanical engineering, wood craft and design, Electronics and automation…*

Universitat de Girona. Polytechnic School

- *Machine Design lab (D. M.)*
- *Mechanical and Numerical Control Workshop (M.N.C.W.).*

Politecnico di Torino

The labs available to MIMS students are the following:

- *The Integrated Additive Manufacturing Lab*
- *The Economics and Production Laboratory*
- *The Technology Lab (LATEC)*
- *Basic Informatics Laboratories (LAIB):*
- *Quality Engineering and Industrial Metrology Laboratory (QM-LAB)*
- *The Mind4Lab, a multidisciplinary laboratory that integrates the main enabling technologies of Industry 4.0 (cobots, automatic warehouses, augmented reality, etc.)"*

Videos and a detailed information about classrooms, workshops, laboratories from each institution dedicated to the master

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Assessment

First of all, it should be noted that the visit was carried out online, so there was no opportunity to visit the facilities. The evaluation was based on the videos provided by the consortium. Furthermore, as this was an ex-ante evaluation, the evidence provided was considered sufficient.

The panel considers facilities appropriate at each university, although it is difficult to assess without a number of users and extent of the use (i.e. number of students using computers x number of hours of use of the computers / number of available computers for students).

Compliant

TRANSPARENCY AND DOCUMENTATION

Relevant information about the programme like admission requirements and procedures, course catalogue, examination and assessment procedures etc. should be well documented and published by taking into account specific needs of mobile students.

Evidence

SAR

Web prototype (https://epsapps.udg.edu/mims/)

Assessment

Currently, the website is under construction so some information is not available and therefore the SAR has referred to the websites of the partner universities. The panel has assess the accessibility and the completeness of the website. Nevertheless, before the implementation of the study programme the web page should offer a complete information about the following items.

- **Admission requirements**

  Admission requirements and selection criteria and procedure as well as recognition criteria are described in the SAR, the information at the web site is incomplete and even there is a website call “Application Step by Step” is not available.

- **Curriculum, course catalogue, syllabi**

  The MIMS programme will be included in the course catalogue of Politecnico di Torino (PdT), which provides a comprehensive overview of all degree programs offered by PdT. This catalogue includes information on admission requirements, campus location and internationalization opportunities, which can be found on the PdT website dedicated to master’s degree programs (https://www.polito.it/en/education/master-s-degree-programmes). A separate website will also be created specifically for prospective students to provide them with information about the application process, program structure, academic calendar, and opportunities for mobility and internships. This website will also feature a section where students can learn about the content and ECTS of each module offered, view syllabi, find out about lecturers, and learn about the learning outcomes and assessment methods for each course.

  It is very important to develop a unique learning platform for shearing all educational information.

- **Examination and assessment procedures**

University of Gavle will publish all information about their MIMS program, such as admission requirements and procedures, course catalogues, examination and assessment procedures on its website. The description of the program, the complete curriculum, ECTS to be passed and a description of each one, the objectives of the course, the teaching staff, etc. will be reflected. The Universitat de Girona will also provide digital collections for students to conduct research, consult academic literature, collect and analyse data, and critically reflect on their findings.

Examination and assessment procedures will be published online and will be available for all public. Specific information for enrolled students such as grades will be shared via virtual learning environments.

Finally, the consortium has submitted an action plan in which it undertakes that information on staff, curriculum and facilities will be published on December 2023 and, Curriculum, course catalogue and syllabi, course examinations and assessment procedures will be published on February 2024. Attending the special importance of transparency and public information, this issue will be followed up within three years since the study programme starts.

Compliant

Recommendation

To follow up action plan of public information and website design.

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QUALITY ASSURANCE

The cooperating institutions should apply joint internal quality assurance processes in accordance with part one of the ESG.

Evidence

SAR

"the partners have developed a joint internal quality assurance strategy which enables them to continuously oversee and enhance the quality of the joint programme, in collaboration with all relevant stakeholders."

"Based on the common understanding that each of the partner institutions operates a well-functioning internal quality assurance system, the partners opted to make maximal use of the partners' existing methods. This allows for a lean joint strategy, which avoids duplicating efforts, and which is focused on effectiveness and continuous improvement."

Document of *MIMS strengths*

Weaknesses

- *Numerous jobs-to-be done by students before arrival (visa, insurance, accommodation, travel, etc.)*
- *No previous experience of the three partners as a consortium*
- *Challenging diversity management*

Strengths

- *Attractive proposal of training and complementary activities*
- *High quality research in the field*
- *Latest generation labs*
- *Previous experience in international training*
- *Expertise and relevance of consortium*
- *Connection to industry and territory*

Treats:

- *No interest of self-funded students for MIMS*
- *Incompletion of commitment of associated partners*
- *MIMS does not meet high expectations of students*

- *Student demotivation and/or drop-out*

Assessment

All three partner institutions have their own internal quality assurance system (IQAS) and as it described at the SAR they agreed a common strategy. Also, the consortium has created a quality board (QB) that will meet twice a year and is composed at least by one person per title awarding higher education centre. This highlights the compromise toward quality assurance in this program. Nevertheless, the QB does not comprise any external figures. Not doing so leads to 2 representatives from each of the 3 different universities to take action in possible key points that may lead to conflicts of interest. It would be recommended that 3rd parties are involved in the QB, in order to offer an independent opinion.

The joint internal quality assurance strategy and structure are well described. The Academic Board will be supported by a Quality Board, responsible for monitoring the programme quality and ensuring the academic standards.

In any case, taking into account all that has been exposed in this report regarding the coordination between the teaching staff of the different subjects, the risks presented by such intensive mobility, the need for coordination between the support services of the different partner universities and institutions, as well as the weaknesses exposed in the *MIMS Strengths document*, the need to deploy processes that guarantee a coordinated action of all the participating actors and minimise the risks already detected both in this report and by the consortium itself is noted.

Assessment

Compliant

Recommendation

Include procedures that take into account coordination among support services from each university.

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FINAL ASSESSMENT RESULT

The external review panel briefly present the summary of the assessment as a result of the analysis of the evidence and of the information collected during the visit.

Summary of the assessment

STANDARD	ASSESSMENT
ELIGIBILITY	**Compliant**
- ***Status***	Compliant
- ***Joint design and delivery***	Compliant with conditions
- ***Cooperation agreement***	Compliant with conditions
LEARNING OUTCOMES	**Compliant**
- ***Level***	Compliant
- ***Disciplinary fields***	Compliant
- ***Achievement***	Compliant
- ***Regulated professions***	Compliant
STUDY PROGRAMME	**Compliant**
- ***Curriculum***	Compliant
- ***Credits***	Compliant
- ***Workload***	Compliant
ADMISSION AND RECOGNITION	**Compliant**
- ***Admission***	Compliant
- ***Recognition***	Compliant
LEARNING, TEACHING AND ASSESSMENT	**Compliant**
- ***Learning and teaching***	Compliant
- ***Assessment of students***	Compliant
STUDENT SUPPORT	**Compliant**
RESOURCES	**Compliant**
- ***Staff***	Compliant
- ***Facilities***	Compliant
TRANSPARENCY AND DOCUMENTATION	**Compliant**
QUALITY ASSURANCE	**Compliant**

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This External assessment committee recommends to the Institutional and Programme Review Commission of AQU Catalunya the favourable ex-accreditation of the programme evaluated with the level of “Compliant”. The Chair of the external evaluation committee states that this document constitutes the assessment report.

LOPEZ JIMENEZ PETRA AMPARO - 52653007G

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Valencia, November 10th 2023

Dra. Amparo Lopez