PROCESS INTELLIGENCE (EMaCS-02-04)				
DEGREE PROGRAM:		Master in Computer Science for the Human-Centric and Sustainable Industry		
SEMESTER: Second	**TYPE:** Elective	**CREDITS:** 5 ECTS	**WORKLOAD:** 125 hours	**MENTORING:** 1 hours/week
LANGUAGE: English				

OBJECTIVES	
General	The students can design and implement applications for process automation, as well as reconstruct, analyse, and evaluate process models based on process data. For this purpose, they possess the following theoretical and practical competencies.
Specific	• Design and implementation of executable process models based on Business Process Management Systems (BPMS) / Workflow Management Systems (WfMS). • Methods for process automation based on Robotic Process Automation. • Methods and techniques for process analysis and simulation. • Process Mining methods and techniques for Process Discovery. • Methods and techniques for monitoring processes (Monitoring, Conformance Checking). • Methods and techniques for analysing other process perspectives based on process data (e.g., Social Network Analysis, System Landscape). • Additional topics based on current relevance.

SUSTAINABILITY

The Process Intelligence course significantly contributes to sustainability by empowering students to design and implement applications for process automation. Through the exploration of Business Process Management Systems (BPMS), Workflow Management Systems (WfMS), and Robotic Process Automation (RPA), students gain insights into methodologies that can enhance efficiency and reduce resource consumption. The course's focus on process analysis, simulation, and Process Mining further aids in identifying areas for optimization, contributing to sustainable practices. By cultivating a proactive and innovative mindset, students are encouraged to seek opportunities for automation that align with sustainability goals. The emphasis on ethical outcomes underscores the importance of considering the broader impacts of process automation on employees, stakeholders, and society, fostering a responsible approach to technological advancements.

RESILIENCE AND HUMAN-CENTRIC DEVELOPMENT

The Process Intelligence course plays a crucial role in fostering resilience and human-centric development by equipping students with the skills needed to analyse, evaluate, and optimize processes. The emphasis on Business Process Management Systems, Robotic Process Automation, and Process Mining aligns with modern approaches to enhance organizational resilience. Students develop the ability to choose suitable automation methods, considering diverse application scenarios. The course promotes a proactive and innovative mindset, encouraging students to identify and implement process improvements that contribute to human-centric goals. Recognizing the significance of continuous learning, students are prepared to stay updated with emerging technologies, fostering adaptability in the face of changing business landscapes. The ethical and responsible approach cultivated in the course ensures that technological advancements align with human values and societal well-being.

SUBJECT MATTER

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COMPETENCES

C1. AQUIRING DATA, INFORMATION AND DIGITAL CONTENT
C2. BROWSING, SEARCHING AND FILTERING DATA, INFORMATION AND DIGITAL CONTENT
C3. MANAGING AND EVALUATING DATA, INFORMATION AND DIGITAL CONTENT
C4. INTEGRATING AND RE-ELABORATING INFORMATION and DIGITAL CONTENT

C6. USING MACHINE LEARNING AND A.I. TECHNIQUES
C8. PROTECTING HEALTH AND WELL-BEING
C9. REFLECTING ON ETHICAL OUTCOMES
C10. EXPLORATORY AND CRITICAL THINKING
C12. IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES
C17. COMMUNICATING EFFECTIVELY

LEARNING OUTCOMES

Knowledge	• Know about various methods and techniques used in process automation, including Business Process Management Systems (BPMS), Workflow Management Systems (WfMS), and Robotic Process Automation (RPA). • Know about methods for process model reconstruction through Process Mining and understand their application in different scenarios. • Know about methods for qualitative and quantitative process analysis and simulation.
Skills	• Develop the skills to analyse and evaluate processes and process fragments in terms of their automatability. • Gain the ability to assess and select suitable Business Process Management Systems for different application scenarios and implement automation solutions using these systems. • Acquire the skills to evaluate, select, and apply methods of process automation from the field of Robotic Process Automation for various application scenarios. • Develop the capability to choose and apply methods for process model reconstruction through Process Mining. • Gain proficiency in applying methods for qualitative and quantitative process analysis and simulation. • Develop the skills to analyse and interpret various process perspectives and data for comprehensive process understanding.
Attitudes/values	• Cultivate a proactive and innovative mindset when analysing and evaluating processes for automatability, seeking optimization opportunities through automation. • Value the importance of Business Process Management Systems, Robotic Process Automation, and Process Mining as valuable tools for process optimization and digital transformation. • Recognize the significance of continuous learning and staying updated with emerging methods and technologies in process automation. • Develop an ethical and responsible approach to process automation, considering the potential impacts on employees, stakeholders, and society as a whole.

TEACHING METHODS

- Seminar-style teaching methods: Work in small groups, board work, multimedia presentations, voluntary exercise tasks, academic work with publications, application-oriented work using online materials and current tools.
- Practical work: Task processing in small groups with a concluding acceptance discussion, presentations, and written assignments.

EVALUATION

- Regular examination format: Graded written exam.
- Alternative examination formats: Graded oral examination or graded presentation.

In cases where multiple examination formats are possible for the module, the responsible lecturer will announce the required format at the beginning of the course.

Prerequisite (PVL): Successful completion of the exercise tasks.

PRECONDITIONS

None

DEPARTMENT	Computer Science

LECTURERS	Martin Schultz Zhen Ru Dai Ulrike Steffens: https://www.researchgate.net/profile/Ulrike-Steffens/2
LITERATURE	• W. van der Aalst: Process Mining: Data Science in Action, Berlin Heidelberg: Springer • M. Weske: Business Process Management: Concepts, Languages, Architectures, Springer • M. Dumas, M. L. Rosa, J. Mendling, und H. Reijers: Fundamentals of Business Process Management, Springer • State of the art scientific papers