**Syllabus**

1. **Information regarding the program**

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| 1.1 Higher education institution | Babes-Bolyai University, Cluj-Napoca |
| 1.2 Faculty | Faculty of Mathematics and Computer Science |
| 1.3 Department | Department of Computer Science |
| 1.4 Field of study | Computer Science |
| 1.5 Study cycle | Bachelor |
| 1.6 Study programme / Qualification | Computer Science |

1. **Information regarding the discipline**

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| 2.1 Name of the discipline | | | Affective Computing | | | |  |  |
| 2.2 Course coordinator | | | Lecturer dr. eng. Iulian Bența | | | | |  |
| 2.3 Seminar coordinator | | | Lecturer dr. eng. Iulian Bența | | | | |  |
| 2.4 Year of study | **3** | 2.5 Semester | | **5** | 2.6 Type of evaluation | **C** | 2.7 Type of discipline | **Optional** |
| 2.8 Code of discipline | **MLE5150** | | | | | | | |

**3. Total estimated time (hours/semesterof didactic activities)**

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| --- | --- | --- | --- | --- | --- | --- |
| 3.1 Hours per week | | 5 | Of which: 3.2 course | 2 | 3.3 seminar/laboratory | 3 |
| 3.4 Total hours in the curriculum | | 70 | Of which: 3.5 course | 28 | 3.6 seminar/laboratory | 42 |
| Time allotment | | | | | | hours |
| Learning using manual, course support, bibliography, course notes | | | | | | 5 |
| Additional documentation (in libraries, on electronic platforms, field documentation) | | | | | | 5 |
| Preparation for seminars/labs, homework, papers, portfolios and essays | | | | | | 10 |
| Tutorship | | | | | | 2 |
| Evaluations | | | | | | 8 |
| Others activities................................... | | | | | | - |
| 3.7 Total hours for individual study | 30 | |  | | | |
| 3.8 Total hours per semester | 100 | |  | | | |
| 3.9 Number of ECTS credits | 4 | |  | | | |

**4. Preconditions (if necessary)**

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| 4.1 curriculum | - Algorithms, Data structures |
| 4.2 competencies | - High level programming language (OOP) skills |

**5. Conditions (if necessary)**

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| 5.1. for the course | A room with Internet access and presentation devices |
| 5.2. for the seminar / lab activities | A room with computers (with up to date processing power, minimum 16 GB RAM) and high-speed Internet access |

6. Acquired specific competences

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| **Professional competences** | C3.1 Description of concepts, theories and models used in the application domain  C3.2 Identification and explanation of basic informatic models for the application domain  C3.3 Use of informatic and mathematical models and tools to solve domain specific problems  C3.4 Data and model analysis  C3.5 Design and development of software components for interdisciplinary projects |
| **Transversal competences** | CT1 Application of efficient and organized work rules, of responsible attitudes towards the didactic-scientific domain, to creatively value one’s own potential, with the respect towards the principles and norms of professional ethic.  CT2 Efficient fulfilment of organized activities in an interdisciplinary group and development of empathic abilities of interpersonal communication, relationship and collaboration with various groups  CT3 Use of efficient methods and techniques to learn, inform, research and develop the abilities to value the knowledge, to adapt to requirements of a dynamic society and to communicate in Romanian language and in a language of international circulation |

**7. Objectives of the discipline(outcome of the acquired competencies)**

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| 7.1 General objective of the discipline | Developing the ability to analyze, design and implement user’s affective states adapted applications |
| 7.2 Specific objectives of the discipline | - Acquaintance with signals and algorithms for mono, bi and multimodal affective states  - Skills to develop complex modular applications with signal processing, feature extraction and machine learning |

**8. Content**

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| 8.1 Course | Teaching methods | Remarks |
| 1. Introduction to Affective Computing (examples, historical facts, definitions) | Presentation, interactive lecture, discussions, case studies, problem solving | 1 lecture / week |
| 1. Affect Models (Russell, activation-valence, OCC, appraisal) |
| 1. Affective States Representation (discrete, dimensional, fuzzy; measures in modelling) |
| 1. Facial Expression Recognition (models, approaches, model fusion, deep learning) |
| 1. Voice-based Affective States Assessment (feature extraction, pattern recognition) |
| 1. Physiological Affective States Detection (feature extraction, pattern recognition) |
| 1. Affective States Assessment from Other Communication Channels (kinesthetic-postural, contextual, text content) |
| 1. Multimodal Affective States Detection (sensor fusion, computing infrastucture) |
| 1. Presentation and discussion of the Theoretical Projects |
| 1. Ethical Aspects in Affective Computing |
| 1. -12. Presentation and discussion of the Practical Projects (I and II) |
| 1. -14. Research Challenges in Affective Computing (I and II) |
| References  1. Emotionale Intelligenz erhöhen: Emotionen wahrnehmen, verstehen und ausdrücken, by Casten Voller,  ISBN-13: 978-1521902776, ISBN-10: 1521902771, 2017  2. Mensch und Maschine: Wie künstliche Intelligenz und Roboter unser Leben verändern, by Thomas Ramge (Author), Dinara Galieva (Illustrator), ISBN-13: 978-3150194997, ISBN-10: 3150194997, 2018  3. The Oxford Handbook of Affective Computing (Oxford Library of Psychology) 1st Edition, by Rafael A. Calvo (Editor), Sidney D'Mello (Editor), Jonathan Gratch (Editor), Arvid Kappas (Editor), ISBN-13: 978-0199942237, ISBN-10: 9780199942237, 2014  4. Emotions and Affect in Human Factors and Human-Computer Interaction, by Myounghoon Jeon (Editor), ISBN-13: 978-0128018514, ISBN-10: 0128018518, 2017.  5. Deep Learning. Das umfassende Handbuch: Grundlagen, aktuelle Verfahren und Algorithmen, neue Forschungsansätze, Ian Goodfellow, Yoshua Bengio, Aaron Courville, mitp Professional, 2018 | | |
| 8. 2 Seminar/laboratory | Teaching methods | Observations |
| 1. Project themes presentation. Project analysis and design phase. | Explanations,  Demonstrations, Discussion,  Brainstorming,  Case studies, Colaboration |  |
| 1. Hands-on experience with available Affective Computing solutions |
| 1. Designing and implementing a simple Facial Expression Recognition System |
| 1. Designing and implementing a bimodal Affective State Assessment System |
| 1. Using Mobile and Wearable Devices for Affective Computing |
| 1. - 7 . Development and refinement of the Practial Projects (I and II) |
| References  1. Emotionale Intelligenz erhöhen: Emotionen wahrnehmen, verstehen und ausdrücken, by Casten Voller,  ISBN-13: 978-1521902776, ISBN-10: 1521902771, 2017  2. Mensch und Maschine: Wie künstliche Intelligenz und Roboter unser Leben verändern, by Thomas Ramge (Author), Dinara Galieva (Illustrator), ISBN-13: 978-3150194997, ISBN-10: 3150194997, 2018  3. The Oxford Handbook of Affective Computing (Oxford Library of Psychology) 1st Edition, by Rafael A. Calvo (Editor), Sidney D'Mello (Editor), Jonathan Gratch (Editor), Arvid Kappas (Editor), ISBN-13: 978-0199942237, ISBN-10: 9780199942237, 2014  4. Emotions and Affect in Human Factors and Human-Computer Interaction, by Myounghoon Jeon (Editor), ISBN-13: 978-0128018514, ISBN-10: 0128018518, 2017.  5. Deep Learning. Das umfassende Handbuch: Grundlagen, aktuelle Verfahren und Algorithmen, neue Forschungsansätze, Ian Goodfellow, Yoshua Bengio, Aaron Courville, mitp Professional, 2018 | | |

**9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program**

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| The curricula of this course aligns to the guidelines of ACM and IEEE  The software organisations recognize the importance of the concepts discussed during this course for the development of functional, user-friendly and intelligent products. |

**10. Assessment (examination)**

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| Type of activity | 10.1 Assessment criteria | 10.2 Assessment methods | 10.3 Weight in the final grade |
| 10.4 Course | - Basic knowledge of the Affective Computing domain  - Operationalization of the principles and technologies to design and develop affective states assessment applications | Theoretical Projects Presentation | 30% |
| 10.5 Seminar/laboratory | - Analyze, Design, Implementation and Testing affective states assessment applications | Practical Projects Presentation | 50% |
| Systematical observation of the student through the laboratory activities | 20% |
| 10.6 Minimum performance standard | | | |
| Each student should demonstrate that he/she reached an acceptable level of knowledge and understanding of the Affective Computing domain, that she/he is able to express the knowledge in a coherent form and that is able to practically apply those in order to solve real world problems for the user benefit in an ethical manner.  It is necessary to obtain a minimum grade of 5 (average of Course and Laboratory) and to demonstrate a minimal but functional and original affective assessment application in order to pass this discipline. | | | |

Date Signature of course coordinator Signature of seminar coordinator

13.04.2023 Lecturer PhD. Eng. Iulian Bența Lecturer PhD. Eng. Iulian Bența

Date of approval Signature of the head of department

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