

# Syllabus

## 1. Information regarding the program

|  |   |
|--|---|
| 1.1 University                         | 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 Program level (bachelor or master) | Bachelor                                    |
| 1.6 Study program / Qualification      | Computer Science – German line              |

## 2. Information regarding the discipline

|                            |                                |              |   |                        |   |                        |          |
|----------------------------|--------------------------------|--------------|---|------------------------|---|------------------------|----------|
| 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 |

## 3. Total estimated time (hours/semester of didactic activities)

|   |     |                          |    |                        |       |
|---|-----|--------------------------|----|------------------------|-------|
| 3.1 Number of hours per week  | 3   | out of which: 3.2 course | 2  | 3.3 seminar/laboratory | 1     |
| 3.4 Total number of hours in the curriculum   | 40  | out of which: 3.5 course | 28 | 3.6 seminar/laboratory | 14    |
| Time distribution   |     |                          |    |                        | Hours |
| Study after textbook, course support, bibliography and notes                                |     |                          |    |                        | 10    |
| Additional documentation in the library, through specialized databases and field activities |     |                          |    |                        | 10    |
| Preparing seminars/laboratories, essays, portfolios and reports.                            |     |                          |    |                        | 14    |
| Tutoring  |     |                          |    |                        | 8     |
| Assessment (examinations)   |     |                          |    |                        | 18    |
| Others activities.....  |     |                          |    |                        | -     |
| 3.7 Total hours for individual study  | 64  |                          |    |                        |       |
| 3.8 Total hours per semester  | 100 |                          |    |                        |       |
| 3.9 Number of credits   | 4   |                          |    |                        |       |

## 4. Preconditions (if necessary)

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

## 5. Conditions (if necessary)

|   |   |
|---|---|
| 5.1. For course development               | A room with Internet access and presentation devices  |
| 5.2. For seminar / laboratory development | A room with computers (with up to date processing power, minimum 8 GB RAM) and high-speed Internet access |

## 6. Acquired specific competences

|                          |  |
|--------------------------|--|
| Professional competences | C3.1 Description of concepts, theories and models used in the application domain<br>C3.2 Identification and explanation of basic informatic models for the application domain<br>C3.3 Use of informatic and mathematical models and tools to solve domain specific problems<br>C3.4 Data and model analysis<br>C3.5 Design and development of software components for interdisciplinary projects |
|--------------------------|--|

|                         |   |
|-------------------------|---|
| Transversal competences | <p>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 etc.</p> <p>CT2 Efficient fulfillment of organized activities in an interdisciplinary group and development of empathic abilities of interpersonal communication, relationship and collaboration with various groups</p> <p>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</p> |
|-------------------------|---|

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

|                                 |   |
|---------------------------------|---|
| 7.1 Subject's general objective | Developing the ability to analyze, design and implement user's affective states adapted applications  |
| 7.2 Specific objectives         | <ul style="list-style-type: none"> <li>- Acquaintance with signals and algorithms for mono, bi and multimodal affective states</li> <li>- Skills to develop complex modular applications with signal processing, feature extraction and machine learning</li> </ul> |

### 8. Contents

| 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 |
| 2. Affect Models (Russell, activation-valence, OCC, appraisal)   |   |                  |
| 3. Affective States Representation (discrete, dimensional, fuzzy; measures in modelling)   |   |                  |
| 4. Facial Expression Recognition (models, approaches, model fusion, deep learning)   |   |                  |
| 5. Voice-based Affective States Assessment (feature extraction, pattern recognition)   |   |                  |
| 6. Physiological Affective States Detection (feature extraction, pattern recognition)  |   |                  |
| 7. Affective States Assessment from Other Communication Channels (kinesthetic-postural, contextual, text content)  |   |                  |
| 8. Multimodal Affective States Detection (sensor fusion, computing infrastructure)   |   |                  |
| 9. Presentation and discussion of the Theoretical Projects   |   |                  |
| 10. Ethical Aspects in Affective Computing   |   |                  |
| 11. -12. Presentation and discussion of the Practical Projects (I and II)  |   |                  |
| 13. -14. Research Challenges in Affective Computing (I and II)   |   |                  |
| References   |   |                  |
| <p>1. Emotionale Intelligenz erhöhen: Emotionen wahrnehmen, verstehen und ausdrücken, by Casten Voller, ISBN-13: 978-1521902776, ISBN-10: 1521902771, 2017</p> <p>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</p> <p>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</p> <p>4. Emotions and Affect in Human Factors and Human-Computer Interaction, by Myounghoon Jeon (Editor), ISBN-13: 978-0128018514, ISBN-10: 0128018518, 2017.</p> <p>5. Deep Learning. Das umfassende Handbuch: Grundlagen, aktuelle Verfahren und Algorithmen, neue Forschungsansätze, Ian Goodfellow, Yoshua Bengio, Aaron Courville, mitp Professional, 2018</p> |   |                  |

| 8.2 Seminar/laboratory   | Teaching methods   | Observations |
|--|--|--------------|
| 1. Project themes presentation. Project analysis and design phase.   | Explanations, Demonstrations, Discussion, Brainstorming, Case studies, Collaboration |              |
| 2. Hands-on experience with available Affective Computing solutions  |  |              |
| 3. Designing and implementing a simple Facial Expression Recognition System  |  |              |
| 4. Designing and implementing a bimodal Affective State Assessment System  |  |              |
| 5. Using Mobile and Wearable Devices for Affective Computing   |  |              |
| 6. - 7. Development and refinement of the Practical 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   |  |              |
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**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**

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)**

| 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<br>- Operationalization of the principles and technologies to design and develop affective states assessment applications | Theoretical Projects<br>Presentation                                      | 30%                            |
| 10.5 Seminar/laboratory | - Analyze, Design, Implementation and Testing affective states assessment applications  | Practical Projects<br>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

9.04.2020

Lecturer dr. eng. Iulian Bența

Lecturer dr. eng. Iulian Bența

Date of approval

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Signature of the head of department  
Ph.D. Prof. Anca Andreica