REQUIREMENTS

Semmelweis University, Faculty of Medicine
Name of the managing institute (and any contributing institutes):
Department of Traumatology

Name of the subject: Mesterséges intelligencia a diagnosztikában és műtéti tervezésben

in English: Artificial Intelligence in Diagnostics and Surgery Planning

in German: Künstliche Intelligenz in der Diagnostik und Operationsplanung

Credit value: 1

Number of lessons per week: 1 lecture: practical course: seminar: 1 x 45 mins

Subject type: compulsory course elective course optional course

Academic year: 2022/23/I.

Subject code: AOSTRA882_1A

(In case of a new subject, it is filled by the Dean's Office, after approval)

Name of the course leader: Prof. Dr. László Hangody, member of Hungarian Academy of Sciences
His/her workplace, phone number: Semmelweis University, Department of Traumatology
29-41 Uzsoki utca Budapest 1145, tel: +36 1 467 3851

Position: Head of Department

Date and registration number of their habilitation: 2003. V. 24., DEOEC 10/2003

Objectives of the subject, its place in the medical curriculum:
To gain a user-level understanding of the technology of artificial intelligence, more specifically deep learning; its training, methods and areas of application in medical science and practice.

Place where the subject is taught (address of the auditorium, seminar room, etc.):
Uzsoki Hospital, Orthopedic and Traumatology Department Conference Room (or the Hospital's Council Hall)
29-41 Uzsoki utca Budapest 1145

Successful completion of the subject results in the acquisition of the following competencies:
Student completing this course will gain an understanding of the working principles of artificial intelligence and will be able to perform as high-level professional users of medical equipment and assistive technology utilizing such. The course can also serve as an entry point for students who might decide to delve deeper into this field later on. Will allow to participate in artificial intelligence research projects as medical experts.

Course prerequisites:
Successful completion of the course "Medical biophysics II".

Number of students required for the course (minimum, maximum) and method of selecting students:
Min: 10
Max: 80
Selection method: first come first served

How to apply for the course:
Via the Neptun interface

Detailed curriculum:
(Theoretical and practical lessons shall be given separately by numbering the lessons (by weeks). Please provide the names of the teachers of the lectures and practical lessons and indicate guest lecturers. Do not use attachments!
Always attach a CV for guest lecturers!)

Week 1 The Concept of Artificial Intelligence and Examples of Medical Applications – Introductory Lecture; *Lecturer: Peter Szoldan*

Week 2 Human Model Creation for Describing the World in Science and Medicine; *Lecturer: Istvan Csabai, Doctor of Hungarian Academy of Sciences, Professor of Eötvös Loránd University of Sciences, Department of Physics of Complex Systems*

Week 3 Architecture and Working Principles of Neural Networks; *Lecturer: Peter Szoldan*

Week 4 Challenges and Solutions of Training Neural Networks; *Lecturer: Peter Szoldan*

Week 5 Similarities and Differences of Architectures and Operation of the Central Nervous System and Artificial Intelligence; *Lecturer: Balázs Szegedy, PhD, Research Mathematician of the Rényi Alfréd Mathiematical Research Insitute of the Hungarian Academy of Sciences, Fulkerson Prize recipient (2012), "Momentum" Research Fellowship recipient (2014-)*

Week 6 Audio, Speech, and Text Processing with Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 7 Two-Dimensional Image and Video Processing with Convolutional Neural Networks; *Lecturer: Peter Szoldan*

Week 8 Structure of Medical Images and Three-Dimensional Image Processing with Convolutional Neural Networks; Radiomics and Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 9 Artificial Intelligence in the Practice of Radiological Diagnostics; *Lecturer: Dr. Egyed Zsófia PhD, Head of Radiology Department, Uzsoki Hospital*

Week 10 Examples of Design and Execution of Therapy with Artificial Intelligence; Medical Practitioner's Responsibility; *Lecturer: Peter Szoldan*

Week 11 Operation Planning with Artificial Intelligence: Ultra-Fresh Osteochondral Allograft Donor Matching and Prosthetics Design; *Lecturers: Prof. Dr. László Hangody, member of Hungarian Academy of Sciences, Dr. György Hangody PhD*

Week 12 Practical Challenges of Collecting a Training Set: Case Study of the Training of the Ultra-Fresh Osteochondral Allograft Donor Matching Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 13 The Future of Artificial Intelligence in Medicine; *Lecturer: Peter Szoldan*

Week 14 Exam Prep Q&A Session; *Lecturer: Peter Szoldan*

Week 15 Written Exam; *Lecturer: Peter Szoldan*

Other subjects concerning the border issues of the given subject (both compulsory and optional courses!). Possible overlaps of themes:

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Special study work required to successfully complete the course:

(E.g. field exercises, medical case analysis, test preparation, etc.)

not required

Requirements for participation in classes and the possibility to make up for absences:

Participation in at least 75% of the seminars is required.

Methods to assess knowledge acquisition during term time:

(E.g. homework, reports, mid-term test, end-term test, etc., the possibility of replacement and improvement of test results)

Participation in seminars.

Requirements for signature:

Participation in at least 75% of the seminars and a successful completion of the end-term exam.

Type of examination:

Written Multiple-Choice Exam
Requirements of the examination: (*In case of a theoretical examination, please provide the topic list; in case of a practical exam, specify the topics and the method of the exam)* A satisfactory knowledge of the provided study material, contents of the electronically provided material and contents of the lectures.
Method and type of evaluation: (*Method of calculating the final mark based on the theoretical and practical examination. How the mid-term test results are taken into account in the final mark.)* The result of the end-term exam.
How to register for the examination?: Via the Neptune interface.
Possibilities for exam retake: Oral exam at prearranged time, following registration in Neptune.
Printed, electronic and online notes, textbooks, guides and literature (URL address for online material) to aid the acquisition of the material: Seminar notes will be provided on-line: Semmelweis University e-Learning Portal (Moodle) https://itc.semmelweis.hu/moodle/?lang=hu
Signature of the habilitated instructor (course leader) who announced the subject:
Signature of the Director of the Managing Institute:
Hand-in date:

Opinion of the competent committee(s):
Comments of the Dean's Office:
Dean's signature: