Oktatás, kutatás, gyógyítás: 250 éve az egészség szolgálatában

SEMMELWEIS EGYETEM
ÁLTALÁNOS ORVOSTUDOMÁNYI KAR
Dékán
Dr. Kellermayer Miklós

Az Általános Orvostudományi Kar Tanácsának

2021/2022-es tanév
6/2021 (2021. szeptember 14-i) számú KT határozata

az Asklepios Campus Hamburgon 2021/2022. tanévtől kötelezően választható „Artificial Intelligence in Healthcare and Medical Science" című tárgy bevezetéséről

1. § Az ÁOK Kari Tanácsa az SzMSz I. KÖNYV I.1. RÉSZ III. fejezet 120. § (3) bekezdés b) pont be) alpontjában kapott felhatalmazás alapján megtárgyalta és **elektronikus szavazórendszeren keresztül, nyílt szavazással, egyhangúlag 45 igen, 0 nem, 0 tartózkodom mellett** elfogadta az Általános Orvostudományi Karon a **„Artificial Intelligence in Healthcare and Medical Science" című kötelezően választható tárgy 2021/2022-es tanévtől történő bevezetését,** a melléklet szerinti követelményrendszerrel.

2. § Jelen határozat végrehajtásának határideje: aktuális szenátusi ülésig

3. § A határozat végrehajtásáért felelős: ÁOK dékán

4. § Jelen határozat 2021. szeptember 15. napján lép hatályba.

Budapest, 2021. szeptember 15.

Dr. Kellermayer Miklós
dékán

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REQUIREMENTS

Semmelweis University, Faculty of Medicine
Name of the managing institute (and any contributing institutes):
Asklepios Campus Hamburg (ACH) of the Semmelweis University

Name of the subject:

in English: Artificial Intelligence in Healthcare and Medical Science

in German: Künstliche Intelligenz im Gesundheitswesen und in der Medizinischen Forschung

Credit value: 2

Number of lessons: 14 lessons, 2 x 45 min each, in total 28 x 45 min **lecture: 28 x 45 min**

practical course: - **seminar: -**

Subject type: **compulsory course** **elective course** **optional course**

Academic year: 3, 4 and 5

Subject code:

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

Name of the course leader:

Prof. Dr. Axel Stang

His/her workplace, phone number:

Asklepios Klinik Barmbek, Rübenkamp 220, 22307 Hamburg, Tel: +49 (0)40 181882 3831

Position:

Chief Physician, MD, Hematology, Oncology and Palliative Care Medicine

Director of the Certificated Oncology Center of the Asklepios Klinik Barmbek

Date and registration number of their habilitation:

08/2017

Objectives of the subject, its place in the medical curriculum:
Artificial Intelligence (AI) has the potential to disrupt and innovate all medical processes as we know them. There is an enormous capacity in various fields to improve clinical workflows, by making them more efficient, accurate and cost effective, be it in prevention, pathology, diagnosis, imaging, prognosis prediction or treatment of diseases. AI and computational modelling are also important tools in personalized medicine, clinical trials, biomedical research and drug discovery. AI requires large amounts of data to be gathered and analyzed, which represents a scientific and ethical challenge.

In this course, various experts from distinguished academic institutions and industry will give insights into different aspects of AI and Big Data Analysis. Therefore, this course will prepare students for the medicine of the future.

Place where the subject is taught (address of the auditorium, seminar room, etc.):
Asklepios Campus Hamburg

Successful completion of the subject results in the acquisition of the following competencies:

- Understanding of the importance and principles of AI and Big Data in Medicine and Research
- Insight into Virtual/Augmented Reality, Robotics, Image-Guided Surgery, Data Mining, Tool Boxes, Programming Packages, Computational Modelling, Bioinformatics and Biobanking
- Insight into Clinical Applications of AI, Smart Devices, e-Health-Apps, Clinical Decision Support Tools, Multi-Omics Analyses, Medical Image Computing, Personalized Medicine

Course prerequisites:

- Completion of the pre-clinical phase, intended for students in their 5th to 10th semester.

Number of students required for the course (minimum, maximum) and method of selecting students:

Smallest number of participants: 6
Largest number of participants: 100
Method of selecting the participants: Students that applied for the course will be selected by a random number generator, if necessary

How to apply for the course:

- Online registration via O365 at a definite time

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!)

Lecture 1 (1.5 h): Artificial Intelligence: Basic Principles. PD Dr. Ramin Assodollahi, Founder and CEO ExB Labs

Lecture 2 (1.5 h): Virtual/Augmented Reality, Robotics and Image-Guided Surgery. Prof. Dr. Lena Maier-Hein, DKFZ Heidelberg, Head Division Computer Assisted Medical Interventions

Lecture 3 (1.5 h): Medical Image Computing: Methods and Clinical Applications. Prof. Klaus Maier-Hein, DKFZ Heidelberg, Head Division of Medical Imaging Computing

Lecture 4 (1.5 h): Computational Methods: Applications in Multi-Omics Analyses. Prof. Dr. Oliver Stegle, DKFZ Heidelberg, Head Division Computational Genomics and Systemic Genetics

Lecture 5 (1.5 h): Applied Bioinformatics: Clinical Applications. Prof. Dr. Benedikt Brors, DKFZ Heidelberg, Head Division Applied Biorinformatics

Lecture 6 (1.5 h): Medical Data Science: Basic Principles. Prof. Dr. Dr. Jens Kleesiek, Universitätsklinik Essen-Duisburg, Institut für Künstliche Intelligenz

Lecture 7 (1.5 h): Biobanking: IT-Infrastructure, Softwares and Biomolecular Research Networks, Prof. Dr. Thomas Illig, MHH, Institute for Human Genetics and CEO Hannover Unified Biobank

Lecture 8 (1.5 h): Data Mining: Augmented Designs, Dr. Martin Seifert, CEO Connexome

Lecture 9 (1.5 h): Computational Modelling: Applications in Biomedicine Science, Prof. Dr. Dr. Fabian Theis, Helmholtz Zentrum München, Institute Director and Research Group Leader

Lecture 10 (1.5 h): Smart Devices, eHealth Apps & Co: Clinical Use Cases. Prof. Dr. Sebastian Kuhn, Universität Bielefeld, Institut für Digitale Medzin

Lecture 11 (1.5 h): Bioinformatics: Toolboxes, Prof. Dr. Hubert Hackl, Universitätsklinik Innsbruck, Institut für Bioinformatik

Lecture 12 (1.5 h): Smart Devices and eHealth-Apps: Clinical Applications, Dr. Pamela Aidelsburger, CAREM GmbH, AIT Austrian Institute of Technology GmbH

Lecture 13 (1.5 h): Big Data Analyses: Programming Packages, Dr. Klemens Vierlinger, Wien, Senior Scientist Center of Health and Bioresources, AIT Austrian Institute of Technology GmbH

Lecture 14 (1.5 h): Explainable Artificial Intelligence: An Introduction. Universitätsklinik Essen-Duisburg, Institut für Künstliche Intelligenz

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

- Medical Statistic, Computer Science and Telemedicine

Special study work required to successfully complete the course:
(E.g. field exercises, medical case analysis, test preparation, etc.)

- -

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

- 75% attendance
- Missed classes will be made up for in self-study.

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)

- Oral contributions in the discussion

Requirements for signature:

- 75% attendance
- Signed register

Type of examination:

- Written 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)

- Multiple choice questions from all topics covered in the course

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.)

- 100% written exam

How to register for the examination?:

- 75 % attendance is sufficient as a basic requirement to be admitted to the exam

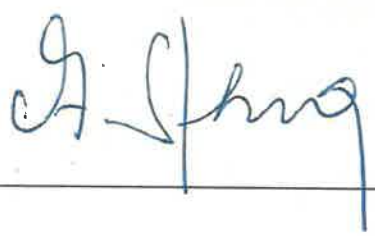
Possibilities for exam retake:

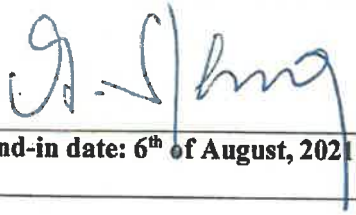
- 2 times

Printed, electronic and online notes, textbooks, guides and literature (URL address for online material) to aid the acquisition of the material:

- Artificial Intelligence in Medicine: Technical Basis and Clinical Applications. Lei Xing, Marylin L- Geiger, James K. Min. eBook or Paperbook, (2020) Elsevier Verlag.
- Deep Medicine. Künstliche Intelligenz in der Medizin. Eric Topol. MITP-Verlag (2019, neue englische Version in Planung).
- Grundkurs Künstliche Intelligenz. Eine praxisorientierte Einführung. Wolfgang Ertel. 4. Auflage (2020). Springer Verlag.

Signature of the habilitated instructor (course leader) who announced the subject:



Signature of the Director of the Managing Institute: 
Hand-in date: 6th of August, 2021

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