# Elective course: Artificial Intelligence , Deep Learning

## About the course

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| subject | Datalogi / Informatik / Mathematical Computer Modelling |
| activitytype | master course |
| Teaching language | English |
| Registration | Tilmelding sker via stads selvbetjening indenfor annonceret tilmeldingsperiode, som du kan se på Studieadministrationens hjemmeside<br><br>Når du tilmelder dig kurset, skal du være opmærksom på, om der er sammenfald i tidspunktet for kursusafholdelse og eksamen med andre kurser, du har valgt. Uddannelsesplanlægningen tager udgangspunkt i, at det er muligt at gennemføre et anbefalet studieforløb uden overlap. Men omkring valgfrie elementer og studieplaner som går ud over de anbefalede studieforløb, kan der forekomme overlap, alt efter hvilke kurser du vælger.<br><br>Registration through stads selvbetjening within the announced registration period, as you can see on the Studyadministration homepage.<br><br>When registering for courses, please be aware of the potential conflicts between courses or exam dates on courses. The planning of course activities at Roskilde University is based on the recommended study programs which do not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programs, an overlap of lectures or exam dates may occur depending on which courses you choose. |
| Detailed description of content | The explosively increasing amount of digitized information has radically changed the potential of machine learning. Combined with the increasing power of computers (from desktops to GPU clusters and huge HPC installations), this has created new opertunities for squeezing interesting knowledge out of all that digitized information.<br><br>While machine learning and Artificial Neural Networks are well-established disciplines, new methods called Deep Learning based on multilayer knowledge representations have emerged. In addition to the increased computational power and available training data, this has also been made possible by the development of better training algorithms. Deep Learning techniques have produced remarkable results for typical Artificial Intelligence tasks such as speech recognition, image analysis and transformations, and medical diagnosis. The course includes<br><br>● An introduction to Machine Learning, what is all about? ● Fundamental concepts of Artificial Neural Networks, feed-forward prediction and learning by back-propagation. ● Deep learning architectures, software platforms and and tools ● Making you own deep learning application<br><br>We will use Google's Tensorflow software in Python through the high-level API Keras. |
| Expected work effort (ECTS-declaration) | The course will have a total workload of 135 hours with 40 hours of lectures and exercises, 70 hours of preparation over an 11 week course period and 25 hours for the exam and preparation before the course. |
| Course material and Reading list | Textbook "Deep learning with Python, Second Edition" by François Chollet. Manning, 2021. Course notes and scientific articles to be announced on moodle. |
| Evaluation- and feedback forms | There will be feedback on exercises which are set during the course. An evaluation will take place at the end of the course. |
| Administration of exams | IMT Studieadministration (imt-studieadministration@ruc.dk) |
| Responsible for the activity | Henning Christiansen (henning@ruc.dk) |
| ECTS | 5 |
| Learning outcomes and | ● Knowledge and understanding of a specific subject area in computer science |

| assessment criteria | <ul><li>Knowledge and understanding of the area's techniques for designing and constructing software systems that meet specific requirements</li><li>Knowledge and understanding of the general principles behind the subject area's theory, methods and technological solutions.</li><li>Skills in electing and applying appropriate methods and techniques from the subject area in order to analyse, design and construct reliable and user-friendly software systems</li><li>Competences in being able to work on computer science-related issues, both independently and in teams</li><li>Competences in being able to become proficient in new approaches to the subject area in a critical and systematic way and thereby independently take responsibility for one's own professional development.</li></ul> |
|---|---|
| Overall content | With an elective course, the student has the opportunity to specialise in a specific subject area where the student acquires knowledge, skills and competences in order to translate theories, methods and solutions ideas into their own practice in relation to software development.<br><br>Examples of elective courses: Robotics, AI, internet technologies, programming language, parallel calculation, mobile computers, etc. The specific contents are listed on study.ruc.dk. |
| Teaching and working methods | Normal class instruction, i.e. a mix of lecturer presentations, student presentations and practical work on specific tasks.<br><br>Lecture with exercises.<br><br>Is stated in the description on study.ruc.dk. |
| Type of activity | Elective course |
| Form of examination (p1) | Individual oral exam based on an assignment.<br><br>The exam is conducted as a dialogue.<br>There may be posed questions in any part of the curriculum.<br><br>The character limit of the written product is maximum 48,000 characters, including spaces.<br>The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices.<br><br>Time allowed for exam including time used for assessment: 20 minutes.<br>The assessment is an overall assessment of the written product(s) and the subsequent oral examination.<br><br>Permitted support and preparation materials for the oral exam: All.<br><br>Assessment: 7-point grading scale.<br>Moderation: Internal co-assessor. |
| Form of Re-examination (p1) | Samme som ordinær eksamen |
| Exam code(s) | Exam code(s) : U40868 |

# Course days:

## Hold: 1

# Artificial Intelligence and Deep Learning (INF)

| time | 13-09-2021 08:15 til<br>13-09-2021 12:00 |
|---|---|
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 20-09-2021 08:15 til<br>20-09-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 27-09-2021 08:15 til<br>27-09-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 04-10-2021 08:15 til<br>04-10-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 11-10-2021 08:15 til<br>11-10-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 18-10-2021 08:15 til<br>18-10-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 25-10-2021 08:15 til<br>25-10-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 01-11-2021 08:15 til<br>01-11-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 08-11-2021 08:15 til<br>08-11-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning (INF)

| | |
|---|---|
| time | 15-11-2021 08:15 til<br>15-11-2021 12:00 |
| location | 10.1-025 - teorirum (32) |
| Teacher | Henning Christiansen ( henning@ruc.dk ) |

## Artificial Intelligence and Deep Learning - Hand-in (INF)

| | |
|---|---|
| time | 22-11-2021 10:00 til<br>22-11-2021 10:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |

## Artificial Intelligence and Deep Learning - Oral examination (INF)

| | |
|---|---|
| time | 04-01-2022 08:15 til<br>05-01-2022 18:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 09.2-053 - mødelokale (5) |

## Artificial Intelligence and Deep Learning - Reexam - Hand-in (INF)

| | |
|---|---|
| time | 14-02-2022 10:00 til<br>14-02-2022 10:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |

# Artificial Intelligence and Deep Learning - Oral reexamination (INF)

| | |
|---|---|
| time | 21-02-2022 13:00 til 21-02-2022 18:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 09.2-053 - mødelokale (5) |