Subject Module Course 4: Essential Computing II

Om kurset

Subject	Fagmodul i Datalogi
Activitytype	subject module course
Teaching language	English
Registration	Tilmelding sker via stads selvbetjening indenfor annonceret tilmeldingsperiode, som du kan se på Studieadministrationens hjemmeside 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. Registration is happing through stads selvbetjeningwithin the announced registration period, as you can see on the Studyadministration homepage. 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.
Academic prerequisites	It is recommended that the subject module course 1 'Essential Computing I' is followed before attending this course Students should have knowledge of either an object-oriented or procedural language. Knowledge of basic programming language features, including primitive data types, operators, control structures, functions (methods), and input/output is assumed
Foreign language reading proficiency	English at a level equivalent to the Danish gymnasium level B
Objectives description (assessment criteria)	The object of the course is to enable students to acquire: **Knowledge** • Knowledge of the theory and practice of fundamental algorithms and data structures. • Knowledge of computability. • Knowledge of the complexity and scalability of programs. • Knowledge of phases in IT systems development, from specification to testing. **Skills** • Skills in programming in a high-level programming language, using techniques for modularisation and abstraction. • Skills in the systematic testing of software. **Competencies** • Competency in the design and development of software systems consisting of multiple components which are robust and scalable. • Competency in being able to reflect on, choose between and argue for different solutions.
Overall content	The theory and practice of fundamental algorithms and data structures; computability; complexity and scalability of programs; phases in IT system development from specification to testing. • How to apply modular design, splitting up system functionality. • Why abstraction is a key principle in designing reusable, evolvable software. • Fundamental algorithms and data structures for efficient information storage and retrieval. • Advanced control constructs. Recursion. Exception handling. • Simple thread programming. • The principles of building scalable systems. • Introduction to computability and complexity. • How to design tests and carry them out.

Detailed description of content	On successful completion of the course, the student should be able to: • Design, implement and test small to medium sized applications in an object-oriented programming language • Understand and clearly explain the mechanics of algorithms and data structures involving manipulation of references, nested loops and recursion • Choose among and make use of the most important algorithms and data structures in libraries • Explain how fundamental algorithms for data structures for searching and sorting may be implemented • Analyze time and space usage of algorithms and data structures • Reason about the correctness of an algorithm • Apply the following algorithmic techniques when solving a problem: Divide-and-conquer, dynamic programming, backtracking
Teaching and working methods	The course is a theoretical course with a combination of lectures and problem solving
Expected work effort (ects-declaration)	The course will have a total workload of 140 hours with 40 hours of lectures and exercises, 70 hours of preparation over an 11 week course period and 30 hours for the exam and preparation before the course.
Course material and reading list	The following book will be used (electronically available for free): http://greenteapress.com/wp/think-data-structures/ Further literature will be announced at Moodle
Form of examination	Written/oral examination. 15-minute individual oral examination based on a written individual assignment and the syllabus. A combined assessment is given of the oral examination and the written assignment. The written assignment is based on a set problem, and must be between a minimum of 4,800 characters in all, including spaces, and a maximum of 48,000 characters in all, including spaces. The size specifications include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Papers that fail to meet the size specifications will be refused assessment, and one examination attempt will be deemed to have been used up.
Form of re-examination	Re-examination takes the same form as the ordinary examination.
Examination type	Individual examination
Assessment	7-point grading scale
Moderation	Internal (i.e. course lecturer and an internal examiner assess)
Evaluation- and feedback forms	There will be feedback on the running programming assignments which are set during the course. An evaluation will take place at the end of the course
The responsible course lecturer	Torben Braüner (torben@ruc.dk)
Teacher	Ebbe Vang (ebbevang@ruc.dk)

Kursusgange:

Hold: 1

Subject Module Course 4: Essential Computing II - Lecture 1 (CS)

Tidspunkt	14-02-2019 08:15 til 14-02-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Preliminaries I
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 2 (CS)

Tidspunkt	21-02-2019 08:15 til 21-02-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Preliminaries II
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 3 (CS)

Tidspunkt	28-02-2019 08:15 til 28-02-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Algorithms I
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 4 (CS)

Tidspunkt	07-03-2019 08:15 til 07-03-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)

Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Algorithms II
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 5 (CS)

Tidspunkt	14-03-2019 08:15 til 14-03-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Ekstern underviser	Algorithms III
Indhold	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 6 (CS)

Tidspunkt	21-03-2019 08:15 til 21-03-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Ekstern underviser	Implementations I
Indhold	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 7 (CS)

Tidspunkt	28-03-2019 08:15 til 28-03-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Implementations II
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 8 (CS)

Tidspunkt	04-04-2019 08:15 til 04-04-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Implementations III
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 9 (CS)

Tidspunkt	11-04-2019 08:15 til 11-04-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Applications I
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Lecture 10 (CS)

Tidspunkt	25-04-2019 08:15 til 25-04-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.1-032 - teorilokale (80)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Applications II
Pensum	See Moodle for further information

Subject Module Course 4: Essential Computing II - Written Submission (CS)

Tidspunkt	01-05-2019 12:00 til 01-05-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Pensum	To come

Subject Module Course 4: Essential Computing II - Oral examination - day 1 (CS)

Tidspunkt	07-06-2019 08:15 til 07-06-2019 17:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.2-023 - møderum (8)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Examination schedule will be announced on Moodle
Pensum	To come

Subject Module Course 4: Essential Computing II - Oral examination - day 2 (CS)

Tidspunkt	11-06-2019 08:15 til 11-06-2019 17:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Sted	08.2-023 - møderum (8)
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Indhold	Examination schedule will be announced on Moodle

Subject Module Course 4: Essential Computing II - Reexam: Submission (CS)

Tidspunkt	12-08-2019 12:00 til 12-08-2019 12:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt

Subject Module Course 4: Essential Computing II - Reexamination (CS)

Tidspunkt	19-08-2019 08:15 til 19-08-2019 17:00
Forberedelsesnorm	Ikke valgt
Forberedelsesnorm d-vip	Ikke valgt
Underviser	Ebbe Vang (ebbevang@ruc.dk)
Pensum	To come