

Studieplan 2015/2016

Bachelor in Information Security

Studyprogramcode BIS

Short description

Information security is an interdisciplinary field covering the range from technical knowledge of computers and systems, through the psychology of attempted fraud, forgeries, and to legislation and management. Gjøvik University College has a scientifically strong and international research group in information security and offers bachelor, master, and Ph.D. programmes specialized in information security.

Newly graduated students will be able to understand and practice a whole range of methods to control access to information. These methods are, amongst others, good standards for programming, firewalls as internet security, encrypted information, or just good practice as system administrator. In addition you are expected to be able to apply the correct security measures in different situations, based on analysis of risks and threats. This study programme will provide you with a solid bachelor's degree in Computer Science, with an emphasis on the technical aspects of the study. Courses in information security parallel with information technology will already from the first term give you an understanding of vulnerability, risks and complexity.

Language: The lectures are mainly held in Norwegian, but some of the courses are held in English (see Student handbook). The courses taught in the fifth semester (autumn term) are offered in English, welcoming incoming international students.

Expected learning outcomes

Graduates from this programme will have a defined learning outcome in computer science with a specialisation in information security. Candidates possess knowledge, skills, and general competence primarily in the technological aspects of information security, but also with an accompanying understanding for the human, administrative, ethical, and legal aspects of the discipline. A solid competence in computer science means that units like programming, algorithms, data structures, databases, operating systems, system development, and network and system administration are included in the study programme. In addition, candidates have general competence that enables them to assume roles as trusted employees and good colleagues.

At the end of the study programme, the students are expected to have acquired the following learning outcomes:

Knowledge

- The candidate has broad knowledge of central topics, theories, problems, processes, tools, and methods in computer science and information security.
- The candidate has knowledge of research and development in information security and in computer science in general.
- The candidate is able to update and extend the candidate's own knowledge in information security, and also in the areas of information systems, information technology, and software

development.

- The candidate is aware of the history and tradition of information systems, as well as their character and position in society.
- The candidate can explain professional work methods for development of IT systems.

Skills

- The candidate can apply professional knowledge and relevant results from research and development to practical and theoretical cases and based on this make informed choices.
- The candidate can lead planning of information security in an IT department and can develop policies, routines, and procedures to take care of information security in a company.
- The candidate can assumes roles in system development, programming, and system administration, and will be able to take over special responsibility for security within these fields.
- The candidate can reflect over professional practice and can adjust the candidate's practice under supervision.
- The candidate can find, assess, and refer to information and a body of knowledge and present this to shed light on a case.
- The candidate commands relevant professional tools, techniques, and modes of expression.
- The candidate can use tools which support development of IT systems.

General competence

- The candidate has insight into relevant professional, legal, and ethical problems.
- The candidate can plan and perform various tasks and projects that comprise long time spans, alone and as participant in a team in compliance with applicable legal and ethical requirements and regulations.
- The candidate can present relevant topics like theories, problems and solutions in written, oral and other applicable forms of expression.
- The candidate can exchange arguments and share experience with others that have a background in the same field and by this can contribute to development of good practice.
- The candidate is aware of innovation and innovation processes.

Technical Prerequisites

A laptop is required.

Publiser Yes **Degree**

Bachelorgrad

Bachelor of Science in Information Security 2013-2016

Coursecode	Course name	C/E *)	ECTS e	ECTS each. semester				
			S1(A)	S2(S)	S3(A)	S4(S)	S5(A)	S6(S)
IMT1121	Introduction to Information Security	C	10					
IMT1031	Fundamental Programming	С	10					
REA1101	Mathematics for computer science	С	10					
IMT1132	Introduction to Information Security Risk Management	С		10				
IMT2431	Data Communication and Network Security	С	Ī	10				
IMT1082	Object-Oriented Programming	С	Ī	10				
IMT2571	Data Modelling and Database Systems	С			10			
IMT2021	Algorithmic Methods	С	<u> </u>		10			
IMT2521	Network Administration	С			10			
IMT2243	Software Engineering	С				10		
IMT3521	Introduction to security Planning and Incident Handling	С				10		
IMT2282	Operating Systems	С				10		
IMT3501	Software Security	С	Ī				10	
IMT2641	Applied Network Security	С					5	
IMT3491	Ethical Hacking and Penetration Testing	С					5	
	Elective course, 10 ECTS	E					10	
IMT3912	Bachelor's thesis	С						20
	Elective course, 10 ECTS	Е						10
		Sum	30	30	30	30	30	30

*) C - Compulsory course, E - Elective course

Electives

Coursecode	Course name	C/E *)	ECTS each. semester		
			S1(A)	S2(S)	
IMT3551	Digital Forensics	E	5		
IMT3281	Application Development	E	10		
SMF1042	Basic Economics	E	10		
IMT3761	Information Warfare	E	5		
IMT3005	Infrastructure as Code	E	10		
IMT3681	IT-management	E		5	
IMT3511	Discrete Mathematics	E		10	
IMT2291	Web Technology	Е		10	
		Sum:	0	0	

*) C - Compulsory course, E - Elective course



Emneoversikt

IMT3551 Digital Forensics - Study plans 2016-2017

Course code: IMT3551

Course name: Digital Forensics

Course level: Bachelor (syklus 1)

ECTS Credits: 5

Duration: Autumn

Language of instruction: English

Prerequisite(s):
The following courses or equivalent background is required:
- IMT2282- Operativsystemer
- IMT2431- Datakommunikasjon og nettverkssikkerhet

Expected learning outcomes:

Forensic science is the application of science and technology to investigate and establish facts of interest in relation to criminal or civil law. The course digital forensics will introduce students to forensic science, as applied to digital evidence. This area has become an integral aspect of information security, and knowledge of the preservation and processing of digital evidence is becoming an essential skill for information security professionals.

Students are able to explain the fundamental principles of digital forensics. The students are able to survey a digital crime scene and to acquire, analyze and present digital evidence in a forensically sound manner. The students are further expected to be able to scientifically document theoretical and experimental results related to forensic investigations, and to evaluate the validity of evidence presented by another party. The course is research-based, with emphasis on the application of scientific publications in practical forensic analysis. After completion of the course, the student shall demonstrate the following competency:

Knowledge

- Digital Forensics methodology with a solid understanding of requirements for handling digital evidence, with an emphasis on evidence integrity and chain of custody

- The students will develop a knowledge of the main publication channels in digital forensics, and selected academic papers are included in the curriculum.

Skills

- Forensic acquisition of digital evidence from computer and network media
- Live system forensics and evaluation of order of volatility
- Evidence analysis with timeline analysis and forensic reconstruction
- Scientific documentation of forensic acquisition and analysis

General Competency

- Legal aspects of cyber crime and cyber crime investigations
- The role of expert witnesses and digital evidence in the context of legal proceedings
- The relationship between digital forensics and incident handling in the context of information security

Topic(s):

- Digital investigations and evidence
- Chain of custody and forensic soundness
- Timeline analysis
- Live system forensics
- File system forensics
- Forensic reconstructions
- Internet and network forensics
- Cybercrime law
- Advanced topics if time permits

Teaching Methods:

Lectures Laboratory work Project work

Teaching Methods (additional text):

The course will be made accessible for both campus and remote students. Every student is free to choose the pedagogic arrangement form that is best fitted for her/his own requirement. The lectures in the course will be given on campus and are open for both categories of students. All the lectures will also be available on Internet through GUC's learning management system (ClassFronter).

Form(s) of Assessment:

Oral presentation Written exam, 3 hours Evaluation of Project(s) Other

Form(s) of Assessment (additional text):

An average where project work counts for 50%, and final written exam counts for 50% of the grade according to the recommended averaging process.

Both parts must be passed.

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner, external examiner is used periodically (every four years, next time in 2018/2019)

Re-sit examination:

For the final exam: Ordinary re-sit examnination.

Tillatte hjelpemidler:

Coursework Requirements: Will be announced later

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility: Associate Professor Stefan Axelsson

Teaching Materials: Textbook will be announced at course start Presentation material and 5 selected academic papers

Replacement course for: IMT3711 Digital Forensic Science



Additional information:

Knowledge of Linux is an advantage. The course will be held in English.

In case there will be less than 5 students that will apply for the course, it will be at the discretion of Studieprogramansvarlig whether the course will be offered or not an if yes, in which form.

Students taking this course as part of their bachelor studies (IMT3551 Digital Forensics) cannot apply to be exempted from taking IMT4012 (Digital Forensics 1) when studying Master in Information Security, because the methods of evaluation in both courses are different.

Publish:



IMT3281 Application Development - Study plans 2016-2017

Course code: IMT3281

Course name: Application Development

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norwegian

Prerequisite(s):

- IMT1031
- IMT1082

On the basis of:

- IMT2021
- IMT2571

Expected learning outcomes:

Knowlegde

- The candidate should be able to describe the principles behind and the structure of general distributed systems.
- The candidate should be able to use ready-made modules as well as design and use class libraries.
- The candidate should be able to organize the functionality in the appropriate class and package structures.

Skills

- The candidate should be able to use existing libraries to produce complex multi-threaded program systems.
- The candidate should master the development of GUI applications with multiple windows
- The candidate should master the use of development tools and version control systems.

General competence

- The candidate can plan and carry out software development projects.
- The candidate may use relevant interaction systems that provide the opportunity to work together on projects even if the participants are located in geographically different locations.
- The candidate will through the work in this course acquire good and practical skills in programming.

Topic(s):

- Class libraries, development and use
- Multithreaded systems
- Window based applications
- Internationalization
- Usage of databases
- Source code documentation
- Usage of development tools and version control systemts

Teaching Methods:

Lectures Laboratory work Project work

Form(s) of Assessment: Other

Form(s) of Assessment (additional text):

- Individual 30 hours digital home exam with incremental deliveries in BitBucket, accounts for 45%
- Evaluation of one bigger project (counts 45%)
- I project that counts for 10 %
- All parts must be passed

The students will be given the URL for a BitBucket repository to be cloned when the exam starts. The internal examiner should be made an admin on the cloned repository. The students should update the repository at a minimum once every hour worth of work.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Internal examiner, external examiner every 4 years, next time in 2018.

Tillatte hjelpemidler:

Coursework Requirements: None

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Universitetslektor Øivind Kolloen

Teaching Materials: Java How to Program, Tenth Edition, Deitel/Deitel, Prentice Hall, 2014

Publish:



SMF1042 Basic Economics - Study plans 2016-2017

Course code: SMF1042

Course name: Basic Economics

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norwegian

Expected learning outcomes:

- Demonstrate a basic knowledge and skills in the economic activity of a company.
- Be able to carry out costs- and income calculations.
- Understand financial statements and perform an account analysis.
- Make product- and investment calculations, planning and budgeting.
- Find profitable solutions to economic problems within a company.

Topic(s):

- Company goal and value chain in a company.
- Company costs and income.
- Methods and practical use of product calculations.
- Financial statements and analysis, internal accounts.
- Product selection, investment, planning and budgeting.
- Economic problems within a company and profit analysis.

Teaching Methods:

Lectures Group works Mandatory assignments Exercises Tutoring Other

Form(s) of Assessment: Written exam, 4 hours

Grading Scale:

Alphabetical Scale, A(best) - F (fail)



External/internal examiner:

• External examiner is used periodically to evaluate contents, arrangements and the examination system. Next time 2016.

Re-sit examination:

August 2017.

Tillatte hjelpemidler:

Examination support:

- Calculator not to be communicate with others.
- Table of interest.
- Laws.
- Ottesen og Øyen, Samling av lover, forskrifter o.l. is not allowed

Coursework Requirements:

- Exercises (3 from 4 must be approved). Delivery in groups of 3, possibly 4 students. Other then 3 demand approval from teacher.
- Details concerning course requirements will be presented at the beginning of the semester.

Academic responsibility:

Faculty of Technology, Economy and Management

Course responsibility:

Høgskolelektor Ivar Moe

Teaching Materials:

- Hoff, Kjell Gunnar, Bedriftens økonomi, Universitetsforlaget, 7. ed., ISBN 978-82-15-01320-6.
- Hoff, Kjell Gunnar og Hoff, Jan Erik, Arbeidsbok til Bedriftens økonomi, Universitetsforlaget, 7. ed., ISBN 978-82-15-01319-0.
- Laws.

Publish:



IMT3761 Information Warfare - Study plans 2016-2017

Course code: IMT3761

Course name: Information Warfare

Course level: Bachelor (syklus 1)

ECTS Credits: 5

Duration: Autumn

Language of instruction: Norwegian

Expected learning outcomes: See norwegian version

Topic(s): See norwegian version

Teaching Methods: Lectures Group works

Teaching Methods (additional text):

The course will be made accessible for both campus and remote students. Every student is free to choose the pedagogic arrangement form that is best fitted for her/his own requirement. The lectures in the course will be given on campus and are open for both categories of students. All the lectures will also be available on Internet through GUC's learning management system (ClassFronter).

Form(s) of Assessment:

Written exam, 3 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner, external examiner is used periodically (every four years, next time in 2012/2013)

Re-sit examination: Ordinary re-sit examination

Tillatte hjelpemidler:

Coursework Requirements: Reports

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Roger Johnsen

Teaching Materials:

Books:

- Global Information Warfare: How Businesses, Governments, and Others Achieve Objectives and Attain Competitive Advantages, Andy Jones / Gerald L. Kovacich / Perry G. Luzwick, Auerbach Pub, utgave 1 (ISBN: 0849311144)
- Påvirkning. Teori og praksis., Robert B. Cialdini, utgave 2003 (ISBN: 82-7935-107-8)

Replacement course for:

IMT5051- Information Warfare

Additional information:

This course is only available for norwegian speaking students.

Publish:



IMT3005 Infrastructure as Code - Study plans 2016-2017

Course code: IMT3005

Course name: Infrastructure as Code

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: English

Prerequisite(s): IMT1082 Object-oriented programming

On the basis of: IMT2282 Operating Systems and IMT3003 Service Architecture Operations

Expected learning outcomes:

Knowledge:

The candidate

- knows how infrastructures can be managed as code with software engineering principles
- has knowledge of professional system administration workflow
- has broad knowledge of cross platform system administration with widely used tools and services

Skills:

The candidate

- can orchestrate and provision infrastructures
- can perform configuration management by declarative programming

- can perform the workflow of introducing changes into production through version controlled repositories and testing-environments

- can deploy and maintain widely used software for logging, monitoring, file service and email service

- can deploy directory services including identity management in heterogenous infrastructures

General competence:

The candidate

- has insight into how development and operations are uniting in the DevOps philosophy

- has insight into how to troubleshoot in different infrastructures

Topic(s):

- Orchestration
- Provisioning
- Declarative programming
- Testing
- Configuration management
- Environments
- Workflow
- Rapid deployments
- Logging, Monitoring and Auditing
- Directory services
- Identity management
- Secure file access
- Email service

Teaching Methods:

Lectures Group works Laboratory work Net Support Learning

Form(s) of Assessment: Other

Form(s) of Assessment (additional text):

An overall evaluation based on 100 point scale, where project work counts 34 points, mid-term test counts 33 points, and final test (2 hours) counts 33 points. Conversion from 100 point scale to A-F scale according to recommended conversion table. In specific circumstances, the course responsible can slightly adjust the limits in the conversion table to enforce compatibility with the qualitative descriptions on the A-F scale.

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner: Evaluated by internal examiner, external examiner is used periodically (every five years, next time in 2019/2020)

Re-sit examination: The next time the course is run.

Tillatte hjelpemidler: D: Ingen trykte eller håndskrevne hjelpemidler tillatt. Bestemt, enkel kalkulator tillatt.

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: <u>Erik Hjelmås</u>

Course responsibility: Erik Hjelmås

Teaching Materials: All teaching material will be available online in the LMS.

Replacement course for: IMT3292 System Administration

Publish: Yes



IMT3681 IT-management - Study plans 2016-2017

Course code: IMT3681

Course name: IT-management

Course level: Bachelor (syklus 1)

ECTS Credits: 5

Duration: Vår

Language of instruction: Norwegian

Prerequisite(s): IMT2243 Systemutviling

Expected learning outcomes:

Students are introduced to centrals aspects of organising and managing IT in business-cooperations. They are expected to be able to reflect on how to organise IT-resources to support business. Further they will be able to interpret IT-strategies for large cooperations and develop an IT-strategy small companies.

Topic(s):

IT-organisation, IT-strategy, Development- and service contracts, Establishinng IT-infrastructure, Outsourcing versus internal ITresources, Managing IT-projects

Teaching Methods:

Essay Lectures Project work Tutoring

Teaching Methods (additional text): Lectures, Groupwork, Projects, Reflection

Form(s) of Assessment: Other

Form(s) of Assessment (additional text): Project/essay 40 % / Written exam 60 %

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Internal. Evaluation from extarnal every 3.rd year

Tillatte hjelpemidler:

Examination support: None.

Coursework Requirements: Not available

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Høgskolelektor Tom Røise

Teaching Materials: Digital forretningsforståelse, Tarjei A. Heggernes, 2013, only in norwegian

+ additional digital materials in fronterroom

Publish:



IMT3511 Discrete Mathematics - Study plans 2016-2017

Course code: IMT3511

Course name: Discrete Mathematics

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Other

Duration (additional text):

In principle this course will be given in the spring semester, but in case there is enough interest, then it can also be given in the fall semester.

Language of instruction: English

Expected learning outcomes: Knowledge:

- The candidate possesses knowledge of important topics within abstract algebra.
- The candidate possesses knowledge of important topics within combinatorics.
- The candidate possesses knowlegde of fundamental topics within graph theory.

Skills:

- The candidate knows relevant methods and terminology in discrete mathematics.
- The candidate is capable of applying his/her knowledge in different courses.

General competence:

• The candidate is capable of understanding and analyzing problems related to abstract algebra, combinatorics and graph theory.

Objectives:

After the course, the students should acquire:

- Understanding of the most important topics of abstract algebra
- Understanding of the most important topics of combinatorics, including fundamentals of graph theory.

Topic(s):

General concepts: * Logic, proofs, sets, algorithms, induction and recursion, combinatorics, discrete probabilities

Graphs: * Connectivity, shortest path, (minimal) spanning trees

Modeling computation: * Finite-state machines, Turing machines

Abstract algebra: * Groups, rings, fields

Teaching Methods:

Lectures Exercises Tutoring

Teaching Methods (additional text):

The course is given as a self reading course, where there is time for the students during lectures to raise questions on the theory and/or the exercises.

The course will be made accessible for both campus and remote students. Every student is free to choose the pedagogic arrangement form that is best fitted for her/his own requirement. The lectures in the course will be given on campus and are open for both categories of students. All the lectures will also be available on Internet through GUC's learning management system (ClassFronter).

Form(s) of Assessment:

Oral exam, individually

Form(s) of Assessment (additional text):

Candidates will get an oral exam (max 45 minutes) with written preparation (max 60 minutes). Candidates will be given a number of assignments within the topics of the course and 60 minutes to prepare written answers. After this the candidates will be questioned about their answer in the oral part.

If the number of students is too high, then the oral exam is replaced by a 3 hour written exam. The students will be notified about this one month prior to the exam at the latest.

Grading Scale:

Alphabetical Scale, A(best) - F (fail)

External/internal examiner:

Evaluated by either internal and external examiner or 2 internal examiners.

Re-sit examination:

The whole course must be repeated.

Tillatte hjelpemidler:

Examination support: Ordinary calculator and dictionary

Coursework Requirements: None.

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Professor Patrick Bours

Teaching Materials:

Kenneth H. Rosen:
Discrete Mathematics and its Applications, 7th ed.
McGraw-Hill International Edition (2012), ISBN 978-0-07-338309-5.
William J. Gilbert and W. Keith Nicholson
Modern Algebra with Applications, 2nd ed.
Wiley (2004), ISBN 0-471-41451-4

Additional information:

In case there will be less than 5 students that will apply for the course, it will be at the discretion of Studieprogramansvarlig whether the course will be offered or not an if yes, in which form.

Publish:



IMT2291 Web Technology - Study plans 2016-2017

Course code: IMT2291

Course name: Web Technology

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: Norwegian

Prerequisite(s): IMT1031 or IMT1441

On the basis of: IMT1082 and IMT2571 or

IMT2261 and IMT3851

Expected learning outcomes:

Knowledge

- The candidate should be able to evaluate different solutions and make reasoned choices for the development of advanced web based applications.
- The candidate should be able to plan and organize the development of web-based applications.
- The candidate should be able to divide a web application in different layers.

Skills

- The candidate should be able to run a web development project and implement a final solution based on a customer's needs.
- The candidate should be able to combine different technologies and principles to create new solutions.
- The candidate should be able to further develop existing products to meet new demands

General competency

• The candidate has knowlegde about central interaction systems that allow work in groups both locally and at distance.

Topic(s):

- The HTTP-protocol
- HTML/CSS
- Serverside programming i PHP
- Cookies and session management
- Database usage
- Client side programming in Javascript
- Bootstrap and jQuery
- Web components and Polymer

Teaching Methods:

Lectures Laboratory work Project work

Form(s) of Assessment:

Home exam, see textarea Evaluation of Project(s)

Form(s) of Assessment (additional text):

- Two projects that accounts for 20% each, totals 40%
- Individual 30 hours digital home exam with incremental deliveries in BitBucket, accounts for 60%
- Both parts must be passed.

The students will be given the URL for a BitBucket repository to be cloned when the exam starts. The internal examiner should be made an admin on the cloned repository. The students should update the repository at a minimum once every hour worth of work.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Internal examiner for both projects and the digital home exam. An external examiner will be used in addition for the digital home exams every fourth year, next will be in 2019.

Tillatte hjelpemidler:

Coursework Requirements: None

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Universitetslektor Øivind Kolloen



Teaching Materials:

PHP and MySQL 24-hour trainer, Andrea Tarr, Wiley, ISBN: 978-1-1180-6688-1

jQuery in Action, second edition, Bear Bibeault and Yehuda Katz, Manning publications. ISBN: 9781935182320

Tutorials and teaching material available trough Fronter

Publish:



IMT1121 Introduction to Information Security - 2015-2016

Course code: IMT1121

Course name: Introduction to Information Security

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Duration (additional text): Fall

Language of instruction: Norwegian

Expected learning outcomes: Knowledge

- Define and describe technical, legal and organisational aspects of information security
- Explain the terminology used in information security
- Knows the history, traditions, distinctive characters and societal importance of information systems
- Present the general threat scenario and explain how this is relevant for a given system

Skills

- Apply acquired academic knowledge on practical and theoretical problems and explain his/her choices
- Find, asses and refer to information and scholarly subject matter and present it in a manner that sheds light on the problem
- Masters relevant academic styles in the field of information security

General competence:

- Is aware of relevant academic, legal and professional issues
- Can carry out and document independent work in accordance with good academic practice
- Can communicate academic subject matters, both in writing and orally
- Know basic methods within new thinking and innovation processes

Topic(s):

- Background, motivation and need for information security
- Legal and ethical issues
- Risk management in information security
- Planning for security
- Firewalls and VPN
- Intrusion detection systems
- Authentication
- Cryptography
- Physical security

Teaching Methods:

Lectures Group works Mandatory assignments

Form(s) of Assessment:

Portfolio Assessment

Form(s) of Assessment (additional text):

The portfolio consist of 4 assignments, all assignments are evaluated. The assignments are handed in both via Fronter and double-sided paper copies to the exams office.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal and external examiner.

Re-sit examination:

No re-sit examination

Tillatte hjelpemidler:

Coursework Requirements:

- Two portfolio hand-ins during the semester
- Two portfolio oral presentations during the semester
- The student must complete the digital 3IKK course (3 hour creativity course) and the subsequent group work.

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: <u>Bian Yang</u>

Course responsibility: Bian Yang

Teaching Materials:

Core reading:

- Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, Thomson Course Technology, 4. ed (2012)
- Gene Kim, Kevin Behr and George Spafford: The Phoenix Project: A Novel About IT, Dev Ops and Helping your Business Win, IT Revolution Press, First edition (2013). Available as e-book on Amazon
- Hand-outs

Additional reading

- Torgeir Daler, Roar Gulbrandsen, Tore Audun Høye og Torbjørn Sjølstad: Håndbok i datasikkerhet informasjonsteknologi og risikostyring, Tapir Akademisk Forlag, 3. utgave (2010)
- Personopplysningsloven and personopplysningsforskriften (available online: <u>www.lovdata.no</u>)

Publish:



IMT1031 Fundamental Programming - 2015-2016

Course code: IMT1031

Course name: Fundamental Programming

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norwegian

Expected learning outcomes:

Knowledge:

- Read and explain fundamental C++ syntax.
- Analyze the problem for simple programming tasks.
- Find and write the program code for solving such a problem.
- Obtain a suitable/appropriate data structures for a computer program, primarily containing arrays/tables.

Skills:

- Using a program develoment tool containing a C++ compiler.
- Understand and use fundamental C++ syntax.
- Writing program code that is implementation/realization of a self-found or already known algorithm.
- Getting to known and change/modify/expand already existing program code.
- Create and manage simple data structures consisting of arrays/tables.

General Competence:

- Work systematically, structured and targeted to solve a (programming) problem.
- Practical own efforts ("hands on ") is the way to new knowledge and skill.

Topic(s):

Construction of programs:

- Step by step
- Algorithms
- Pseudo code

Introduction to language elements as:

- Program structure and expressions
- Types of data, variables, strings and constants
- Operators
- Flow of control (decisions and loops)
- Structures
- Functions and parameters
- Arrays
- Classes and objects

Use of library functions:

- Streams (files and I/O)
- String handling

Teaching Methods:

Lectures Mandatory assignments Exercises

Form(s) of Assessment: Written exam, 4 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Graded by course instructor and examiner.

Re-sit examination:

Re-sit August 2016

Tillatte hjelpemidler:

Examination support: All printed matters and hand written notes

Coursework Requirements:

4 of 5 mandatory assignments must be approved by student assistant. No. 1 must be one of them. Clearly inadequate work, not independently own work or deadline that is not complied is considered as undelivered.

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility: Høgskolelektor Frode Haug



Teaching Materials:

Lafore, Robert. (2002). Object-Oriented Programming in C++. Indianapolis, IN: SAMS. Faglærer. Kompendium. Gjøvik: HiG.

Additional information:

The course overlaps entirely with IMT1241 Basic programming in Java

Publish:



REA1101 Mathematics for computer science - 2015-2016

Course code: REA1101

Course name: Mathematics for computer science

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norwegian

Prerequisite(s): 2MX or REA 3022 Matematikk R1 or equivalent course.

Expected learning outcomes:

The students will learn mathematical tools and methods for engineering problem solving, and have a foundation for further study in mathematics and computer science. The course emphasizes applications.

Knowledge

- Understand the relevance of mathematics in engineering problem solving.
- Able to identify applications of mathematics in engineering subjects.
- Know the possibilities and limitations of mathematical software.

The students will have knowledge in the areas of logic and discrete mathematics, with

Skills

- able to understand and use mathematical language.
- able to use mathematical methods and software to solve problems.
- basic mathematical reasoning.

Topic(s):

- Number theory
- Matrices
- Propositional and predicate logic
- Proofs
- Sets, functions and relations
- Enumerative combinatorics
- Graphs and trees
- Automata and languages

Teaching Methods:

Lectures Mandatory assignments Exercises

Form(s) of Assessment:

Portfolio Assessment Written exam, 4 hours

Form(s) of Assessment (additional text):

- Written exam 4 hours (60%)
- Portfolio (40%)
- The students must pass both the exam and the portfolio.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

Re-sit examination: Re-sit August 2016 for the Written examination.

Tillatte hjelpemidler:

D: Ingen trykte eller håndskrevne hjelpemidler tillatt. Bestemt, enkel kalkulator tillatt.

Academic responsibility:

Faculty of Technology, Economy and Management

Course responsibility: Førsteamanuensis Bernt Tore Jensen

Teaching Materials: Richard Johnsonbaugh: Discrete Mathematics, 7th ed., Pearson/Prentice Hall

Additional material published on classfronter.

Publish:



IMT1132 Introduction to Information Security Risk Management - 2015-2016

Course code: IMT1132

Course name: Introduction to Information Security Risk Management

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: Norwegian

Expected learning outcomes: *Knowledge*

• The candidate can select an appropriate risk assessment methodology suitable for the complexity and documentation accuracy of an information system

Skills

- The candidate can based on given guidelines or standards carry out a risk assessment on a given information system
- The candidate can collaborate with system owners and supervisors and can adjust his or her practice based on their feedback
- The candidate can find, assess and refer to information and material necessary to carry out a risk assessment
- The candidate can use guidelines and standards to structure the implementation of information security in an organisation

General Competence

- The candidate can carry out relatively complex projects in larger groups and accepts the necessity of tools and methods to carry out such tasks
- The candidate is aware of the importance of mastering both oral and written communication depending on the target group (decision makers, colleagues and general public)
- The candidate has gained ownership in a reference project where experience and view-points have been exchanged with collaborative partners and colleagues

Topic(s):

- Project work
- Information security and risk
- Risk evaluation, analysis and assessment
- Standards and guidelines
- Information security management systems

Teaching Methods:

Lectures Project work

Teaching Methods (additional text):

The students are assigned to groups of 6 - 10 persons. Each group gets a task assigned from an external system owner. The projects are formulated such that the students have to carry out a risk assessment as the part of a project work. All projects report to a coordination team. The students get feedback on the group processes and their deliveries (Project plan, status reports, meeting agendas and minutes). Lectures and group assignments are run in parallel.

Form(s) of Assessment:

Evaluation of Project(s)

Form(s) of Assessment (additional text):

One large project. The student groups keep the work going until the quality of the report is satisfying; the final deadline is the 3 week of June.

Grading Scale:

Pass/Failure

External/internal examiner:

Evaluated by internal examiner. External examiner is used periodically (every four years, next time in 2015/2016).

Re-sit examination:

The project must be improved until the quality satisfies the "Pass" criterions.

Tillatte hjelpemidler:

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility: Gaute Wangen

Teaching Materials:

Core reading:

- ISO/IEC 27001
- ISO/IEC 27002
- Nasjonal sikkerhetsmyndighet: Veiledning i risiko og sårbarhetsanalyse (2005)
- Datatilsynet: Risikovurdering av informasjonssystem (2009)

Additional reading:

- T. Aven, W. Røed og H.S. Wienche: Risikoanalyse; prinsipper og metoder, med anvendelser, Universitetsforlaget (2008)
- H. Westhagen, O. Faafeng og K.G. Hoff, T. Kjeldsen og E. Røine: Prosjektarbeid; utviklings- og endringskompetanse, Gyldendal akademisk (2008)
- T. Aven: Risikostyring; grunnleggende prinsipper og ideer, Universitetsforlaget (2007)

Additional information:

The students must have registered for the course by January 15th. The project work starts in the second week of teaching, and active participation in the group assignment is required from all students. The groups formulate their own group contract where the participation is regulated. This contract must be signed by all group members and approved by the course responsible. If a group member violates the contract, the group nominates the candidate for exclusion. The course responsible takes the final decision on exclusion. If a candidate is excluded there are two possible outcomes: (i) The candidate fails the course or (ii) the candidate carries out an individual project. The course responsible makes this decision based on available information on the reason for the nomination documented by written statements from both parties (group and candidate).

Publish:



IMT2431 Data Communication and Network Security - 2015-2016

Course code: IMT2431

Course name: Data Communication and Network Security

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: English

Expected learning outcomes: Knowledge:

- The candidate possesses thorough knowledge of models and protocols in data communication networks.
- The candidate possesses thorough knowledge in the theory of network security.
- The candidate is capable of applying his/her knowledge in the field of IT-security.
- The candidate is capable of updating his/her own knowledge in data communication networks.

Skills:

- The candidate is capable of performing basic network administration tasks.
- The candidate is capable of performing error tracking and solving in basic networks.
- The candidate knows relevant methods and terminology in the area of data communications.

General competence:

- The candidate is capable of working independently and in groups in the field of data communication.
- The candidate is capable of designing, analyzing, and performing maintenance on basic networks.

Objectives:

After completion of the course, the students:

- Will have knowledge of the most used standards and protocols for data communication.
- Will understand the principles of network security.

Topic(s):

- Basics of computer networks
- Application layer (HTTP, SMTP, DNS)
- Transport layer (TCP, UDP)
- Network layer (IP, ICMP, routing)
- IPv6 Network addressing
- Data link and physical layer (Ethernet, MAC, ARP, witching, VLANs)
- Basics of network security, including applied cryptography
- Authentication in networks (Kerberos)
- Firewalls
- Network Intrusion Detection Systems

Teaching Methods:

Lectures Laboratory work Exercises

Form(s) of Assessment: Other

Form(s) of Assessment (additional text):

The exam consists of three/(four optional) parts. These include the final exam of CCNA R&S Module 1 + 2, a written subnetting exercise, a router configuration part using Packet Tracer simulation software (optional) and a written exam of network security.

Part 1: - Final Exam (50 points) CCNA Module 1, I2N

- Part 2: Final Exam (50 points) CCNA Module 2 R&S
- Part 3: written exam network security (50 points),
 - written exam subnetting (50 points / optional 25 points)
 - optional, skill test Packet Tracer (optional 25 points),

All sub-parts must be passed (>=40%) to pass the course

Conversion from 200 point scale to A-F scale according to recommended conversion table. In specific circumstances, emneansvarlig can slightly adjust the limits in the conversion table to enforce compatibility with the qualitative descriptions on the A-F scale.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner, external examiner is used periodically (every four years, next time in 2015/2016)

Re-sit examination:

Single Parts of the exam can be re-taken again.

Tillatte hjelpemidler:

Examination support: None.

Coursework Requirements: None

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: Thomas Kemmerich

Course responsibility: Førsteamanuensis Thomas Kemmerich

Teaching Materials: CISCO Netacademy teaching materials.

Handout articles.

Kurose, J. and Ross, K.W. (2008): Computer Networking: A Top-Down Approach, sixth edition. Addison- Wesley (recommended background material). William Stallings: Cryptography and Network Security: Principles and Practice 6 Ed. (recommended background material).

Replacement course for: IMT3371

Publish: Yes



IMT1082 Object-Oriented Programming - 2015-2016

Course code: IMT1082

Course name: Object-Oriented Programming

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: Norwegian

On the basis of: IMT1031 - Fundamental Programming

Expected learning outcomes:

Knowledge:

- Read and explain more advanced C++ syntax.
- Explain and use object-oriented approach / thinking.
- Find an suitable/appropriate data structure for moderate big computer program.
- Explain the use of a small programming library (toolbox).
- Develop an application (as project work) consisting of a number of different files.
- Understanding the quality aspects of development and maintenance of software.

Skills:

- Understand and use more advanced C++ syntax.
- Solve programming tasks with object-orientation approach/thinking.
- Using and mastering a programming library.
- Choose, create and manage more sophisticated data structures, primarily consisting of lists and arrays/tables.
- Master tools for version control, code analysis and testing.

General Competence:

- Cooperate with other people in a project.
- Analyze, plan and implement a larger work (project).
- Dealing with and adhere to deadlines.

Topic(s):

Principles for object-orientation Introduction to language elements as:

- Classes and objects (repetition)
- Overloading
- Inheritance
- Pointers
- Dynamic allocation
- Lists

- Virtual functions and late binding Bigger programs (application) consisting of multi-files. Tools for version control, code analysis and testing.

Teaching Methods:

Lectures Mandatory assignments Exercises Project work

Form(s) of Assessment: Written exam, 4 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Graded by course instructor and examiner.

Re-sit examination:

Re-sit August 2016

Tillatte hjelpemidler:

Examination support:

All printed and hand-written support material is allowed.

Coursework Requirements:

2 of 3 mandatory assignments and project work must be approved by student assistant. Clearly inadequate work, not independently own work or deadline that is not complied is considered as undelivered.

The mandatory assignments must be submitted before the student can join a group and start the project work. It requires active participation in the project to get it approved. Group participants must sign a paper dealing that all students have been active/participating, and each one can be extracted for an oral exam to get the project approved.

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Høgskolelektor Frode Haug



Teaching Materials:

Lafore, Robert. (2002). Object-Oriented Programming in C++. Indianapolis, IN: SAMS Faglærer. Kompendium. Gjøvik: HiG

Publish:



IMT2571 Data Modelling and Database Systems - Study plans 2016-2017

Course code: IMT2571

Course name: Data Modelling and Database Systems

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norsk, alternativt engelsk

On the basis of:

IMT1031 Fundamental Programming and IMT1082 Object-Oriented Programming, or IMT1241 Fundamental Programming in Java

Expected learning outcomes:

After successful completion, the student is capable of describing:

- database tasks and purpose in applications and computer systems
- database management systems; their role and tasks
- relational databases; their foundation and characteristics
- other types of database management systems (NOSQL)
- structuring and management of semi-structured data (XML)

After successful completion, the student posesses the skills to:

 assess the use of relational database, NOSQL database, and XML in actual applications and computer systems

• develop and evaluate functional and effective conceptual data models - and corresponding logcial, relational models - for real applications

• construct relational database solutions - and select appropriate physical structure - based on the conceptual and logical models designed for the system

- make use of SQL for inserting, querying, and modifying database data
- · develop applications that retrieves and stores data in databases
- utilize XML technologies for storing and processing semi-structured data

The student has acquired general competency in:

- developing abstract models and solutions for practical problems
- assessing alternatives for storing and managing digital data
- using computer tools for developing software systems

Topic(s):

- Databases and database management systems
- Introduction to conceptual data modelling
- The relational model, relational algebra, and SQL
- Database design
- Database normalisation
- Query processing
- Data integrity
- Transaction management
- File organisations and indexes
- Security
- NOSQL databases
- XML data, XML DOM, XPath og XML Schema
- Data transformation

Teaching Methods:

Lectures Laboratory work Mandatory assignments

Form(s) of Assessment: Written exam. 5 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Internal examiner. An external examiner will be involved in the examination at least every fifth year - next time no later than 2020.

Re-sit examination:

Ordinary re-sit offered in August.

Tillatte hjelpemidler:

Coursework Requirements: 5 out of 6 assignments must be passed.

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility: Professor Rune Hjelsvold

Teaching Materials:

- T. Connolly & C. Begg, Database Systems: A Practical Approach to Design, Implementation, and Management. 5th Edition, Addison Wesley 2010 ISBN-10: 0-321-52306-7
- Web resources (titles to be announced at the start of the course)

Additional information:

Overlaps 90% with IMT2261



Publish:



IMT2021 Algorithmic Methods - Study plans 2016-2017

Course code: IMT2021

Course name: Algorithmic Methods

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norwegian

On the basis of: IMT1082 - Object-Oriented Programming

REA1101 - Mathematics for computer science or REA2091 - Mathematics 2 for computer science

Expected learning outcomes:

Knowledge:

- Become familiar with, explain, apply and to some extent be able to rewrite some standard algorithms such as sorting, searching and graph handling.
- Describe and explain various data structures (arrays/tables, linked lists, queues, stacks, trees and graphs).
- Analyze advanced and complex (non-trivial) issues, and finding the algorithm to solve these.
- Apply recursive approach/method of problem solving and programming.
- Using abstraction in the construction of programs.

Skills:

- Writing reliable and efficient / fast computer programs.
- Write the program code that addresses advanced and complicated issues.
- Manage and handle advanced data structures (with particular emphasis on trees and graphs).

General competence:

- Had developed the ability to think and solve sophisticated and complex problems.
- Finding other/newer knowledge (here: algorithms), results and research in the field.

Topic(s):

Techniques and algorithms:

- Object orientation
- Abstract datatypes
- Recursion
- Searching
- Sorting
- Hashing
- Compression

Data Structures:

- Arrays
- Queues
- Stacks
- Pointers and dynamic allocation
- Lists
- Trees
- Graph (connectivity, weighted, directed)
- Network Flow

Efficiency:

- Complexity and O-notation
- Use of time and space

Teaching Methods:

Lectures Exercises Tutoring

Form(s) of Assessment: Written exam, 5 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Graded by course instructor and examiner.

Re-sit examination: Re-sit examination in August.

Tillatte hjelpemidler: A: Alle trykte og håndskrevne hjelpemidler tillatt. Alle kalkulatorer tillatt.

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Universitetslektor Frode Haug



Teaching Materials:

Textbook announced at the beginning of the semester. Faglærer. Kompendium. Gjøvik. Faglærer. Annet utdelt litteratur/artikler/notater. Gjøvik.

Publish:



IMT2521 Network Administration - Study plans 2016-2017

Course code: IMT2521

Course name: Network Administration

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: English

On the basis of:

• IMT2431 Data Communication and Network Security

Expected learning outcomes:

The student will have a solid understanding of the technologies of computer networking, be able to identify the components of the network, and have good knowledge regarding configuration of routed and switched networks and WAN technologies. Also the basics of network security will be treated

Topic(s):

Routing of network traffic, including:

- The TCP/IP protocol family, addressing and subnet calculation
- Routing-protocols RIP, EIGRP and OSPF
- Router components and router configuration

Switching in computer networks, including

- Switching and virtual LANs (VLAN)
- Spanning Tree Protocol
- Supporting systems of switched networks
- Packet filtering and access control

WAN-technologies

- WAN-equipment and communication formats in WAN
- Frame Relay
- PPP, components, session handling and authentication
- Services and supporting systems for access delivery, DHCP and NAT

The dependency on other infrastructure of the network.

Familiarity with tools for monitoring, analysis and auditing of the network, and problem solving in computer networks.

Teaching Methods:

Lectures Group works Laboratory work Net Support Learning Project work

Form(s) of Assessment: Other

Form(s) of Assessment (additional text):

An overall assessment based on two electronic exams and two practical skill tests, each of 50 points. The third part is a group work, designing and describing a complete network environment including security measures and management principles. Conversion from 300 point scale to A-F scale according to recommended conversion table. Each single part must be passed.

In specific circumstances, emneans variig can slightly adjust the limits in the conversion table to enforce compatibility with the qualitative descriptions on the A-F scale.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Electronic exams evaluated externally through Cisco Networking Academy

Skill tests developed and evaluated internally.

Re-sit examination: Whole course must be taken over again.

Tillatte hjelpemidler:

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: <u>Thomas Kemmerich</u>

Course responsibility: Thomas Kemmerich

Teaching Materials: CISCO Networking Academy materials

This course contains of Cisco CCNA Routing § Switching Module 3 + 4

Handout articles.

Publish: Yes

Home page: http://www.hig.no/it/informatikk/emnesider/imt2521



IMT2243 Software Engineering - Study plans 2016-2017

Course code: IMT2243

Course name: Software Engineering

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: Norwegian

Expected learning outcomes:

The candidate have knowledge of plan-driven and agile methodologies in software development and understand basic administrative and technological aspects of the specification, development, testing and maintenance. They know the basic principles in software architecture and design and the value of user participation.

The candidate can apply object-oriented methods and techniques of requirements specification and are able to establish project procedures using agile development methodology. They can work from project idea to a recommended sketch for a software solution in small projects and know the benefit of tools in different parts of the software development process.

The candidate gain awareness of the software's role in business and community and the role of management, teamwork and documentation in software projects.

Topic(s):

The role of software applications in companies. Plan-driven and agile software development methodologies

Project management and risk analysis Methods and techniques in requirement specification and analysis (UML) Principles in Architecture, Design and Testing Tools and Configuration management User participation

Teaching Methods:

Lectures Project work Tutoring

Form(s) of Assessment: Written exam, 3 hours Evaluation of Project(s)

Form(s) of Assessment (additional text):

Written Exam, 3 hours (counts 40%) Evaluation of Project(s) (counts 60%) Each part must be individually approved of.

Grading Scale: Alphabetical Scale, A(best) – F (fail)

Re-sit examination: Re-sit for the written exam in August.

Tillatte hjelpemidler: D: Ingen trykte eller håndskrevne hjelpemidler tillatt. Bestemt, enkel kalkulator tillatt.

Coursework Requirements: None

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Tom Røise

Teaching Materials: Software Engineering, Ian Sommerville, 10th ed

Additional materials will be available at semesterstart.

Publish: Yes



IMT3521 Introduction to security Planning and Incident Handling - Study plans 2016-2017

Course code: IMT3521

Course name: Introduction to security Planning and Incident Handling

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Duration (additional text): One semester

Language of instruction: Norsk, alternativt engelsk

Expected learning outcomes: Knowledge

The student understands contingency planning and its components. This includes the role of policies and procedures as well as risk assessment, business impact analysis, incident reporting and response and business resumption planning.

The student understands how to plan for and perform incident response.

The student understands known problems withing incident reporting systems.

The student has good overview of planning for business continuity of critical business systems.

Skills

The student can plan for and handle larger and smaller incidents and disasters.

The student can organize an incident response team in a manner that ensures good handling of incidents while also making sure staff burnout is avoided.

General Competence

The student has broad knowledge of security planning and incident response and is able to communicate this to others.

The student is able to handle the many conflicts between security and other fields that inevitably arise. Security procedures can for example be seen as cumbersome and ineffective, causing employees to disregard them. The student shall be able to reason and solve such problems.

Topic(s):

1. Introduction and Overview of Contingency Planning

2. Planning for Organizational Readiness: Risk management, limits to risk management, incident reporting systems, business impact analysis

3. Incident Response: Preparation, organization, prevention, detection, notification, reaction, recovery, maintenance, operational problems for CSIRTS and organizational models for CSIRTS

- 4. Disaster Recovery: Preparation, implementation, operation and maintenance
- 5. Business Continuity: Preparation, implementation, operations and Maintenance

6. Crisis Management and Human Factors

Teaching Methods:

Lectures Group works Net Support Learning Project work Tutoring

Teaching Methods (additional text):

Group projects with supervision in addition to lectures.

The course will be made accessible for both campus and remote students. Every student is free to choose the pedagogic arrangement form that is best fitted for her/his own requirement. The lectures in the course will be given on campus and are open for both categories of students. All the lectures will also be available on Internet through the learning management system (ClassFronter).

Form(s) of Assessment:

Written exam, 3 hours Evaluation of Project(s)

Form(s) of Assessment (additional text):

Assessment: An overall evaluation based on a 100 point scale, where project work counts 50 points and final written exam counts 50 points. Conversion from 100 point scale to A-F scale according to recommended conversion table. In specific circumstances, emneansvarlig can slightly adjust the limits in the conversion table to enforce compatibility with the qualitative descriptions on the A-F scale. Both the project and the final exam must be passed to achieve a passing grade in the course.

Grading Scale:

Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner, external examiner is used periodically (every four years, next time in 2014/2015)

Re-sit examination:

No re-sit examination. The entire course has to be redone.

Tillatte hjelpemidler:

Examination support:

English-Norwegian, other language-Norwegian or English-other language dictionary

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility:

Førsteamanuensis Marie Gaup Moe

Teaching Materials:

Michael Whitman, Herbert Mattord and Andrew Green: Principles of Incident Response and Disaster Recovery, 2nd Edition. Thomson, 2014.

Additional literature will be handed out or made available through Fronter.

Additional information:

The lectures given in this course is in common for IMT3521 and the master course IMT4841.

Publish:



IMT2282 Operating Systems - Study plans 2016-2017

Course code: IMT2282

Course name: Operating Systems

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Vår

Language of instruction: Norwegian

On the basis of: Algorithmic methods

Expected learning outcomes:

The students will be aquainted with basic principles and methods in modern operating systems and how they are organized. This will show how a computer can optimize use of the resources. This knowledge shall help the student in evaluation, use and maintainance of operating systems.

Topic(s):

System calls, processes and threads, how they can be synchronized and how they can communicate. CPU - scheduling algorithms. Memory management: Virtual memory, swapping, paging and segmentation. File systems: Implementation, backup, consistens and performance. IO systems: Polling, interrupt and DMA. interrupt handlers, drivers, device independant laver, disk systems and timers. Deadlocks: Detection and recovery, prevention and avoidance.

Virtualization.

Security: Access Control and Malware Programming in C, Bash, PowerShell

Teaching Methods:

Lectures Group works Laboratory work Exercises



Teaching Methods (additional text): Lectures

3 projects Case-study Homework

Form(s) of Assessment: Written exam, 5 hours

Form(s) of Assessment (additional text): Written Exam, 5 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner: See Norwegian version.

Re-sit examination: Re-sit in August.

Tillatte hjelpemidler: D: Ingen trykte eller håndskrevne hjelpemidler tillatt. Bestemt, enkel kalkulator tillatt.

Coursework Requirements: 3 mandatory assignments and 3 multiple choice tests

Academic responsibility: Faculty of Computer Science and Media Technology

Course responsibility: Førsteamanuensis Erik Hjelmås

Teaching Materials: Tanenbaum, A. S and Bos, H. Modern Operating Systems, 4th edition, Pearson Education, 2015.

Publish: Yes



IMT3501 Software Security - 2015-2016

Course code: IMT3501

Course name: Software Security

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn

Language of instruction: Norsk, alternativt engelsk

On the basis of:

- IMT1082 Objekt-orientert programmering
- IMT1121 Innføring i informasjonssikkerhet
- IMT2021 Algoritmiske metoder
- IMT2282 Operativsystemer
- IMT2431 Datakommunikasjon og nettverkssikkerhet

Expected learning outcomes:

Knowledge

- The students have basic knowledge on how software can be created and maintained with security in mind, i.e. deviation from expected functionality owing to interaction with an adversary.
- They understand attack patterns, e.g. *buffer overflows, format string* problems, *command injection,* and *cross-site scripting.*
- The students have an overview of existing techniques, classes of tools and the methods used in software development today.

Skills

- Students can apply their knowledge to problem cases in an industrial or research setting.
- They are able to identify potential threats and vulnerabilities early in a program's lifecycle and apply measures that prevent or reduce vulnerabilities in software.

General competence

• The students succeed in presenting their analyses and approaches to other developers, superiors and customers.

Topic(s):

- Software Assurance
- Secure Software Development Lifecycle
- Coding Practices and Rules
- Source Code Analysis
- Security Testing
- Attack Patterns

Teaching Methods:

Lectures Group works Laboratory work Mandatory assignments Exercises PBL (Problem Based Learning) Tutoring

Form(s) of Assessment: Written exam, 3 hours

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner, external examiner is used periodically (every four years, next time in 2017/2018)

Re-sit examination:

Re-sit August 2016

Tillatte hjelpemidler:

Examination support:

All self-produced hand-written paper-based support is allowed up to 2 pages A4. Support documents have to be turned in with the written examination and will not be returned to the student.

Coursework Requirements:

At least 5 (five) obligatory exercises must be handed in. Hand-ins are marked by other students. Participants must mark as many exercises as they have handed in. If an exercise does not get a passing grade, the student can request that his exercise be marked by the lecturer.

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: Basel Katt

Course responsibility: Basel Katt



Teaching Materials:

- Dowd, M., McDonald, J., and Schuh, J. (2006). The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities. ISBN 0-321-44442-6. Library 005.8 Dow
- Hoglund, G. and McGraw, G. (2004). Exploiting Software: How to Break Code. ISBN 0-201-78695-8. Library 005.8 Hog
- McGraw, G. (2006). Software Security: Building Security in. ISBN 0-321-35670-5. Library 005.8 McG

Replacement course for:

IMT3381 Applikasjonssikkerhet, IMT3571 Datasystemsikkerhet

Publish:



IMT2641 Applied Network Security - 2015-2016

Course code: IMT2641

Course name: Applied Network Security

Course level: Bachelor (syklus 1)

ECTS Credits: 5

Duration: Autumn

Language of instruction: Norsk, alternativt engelsk

Expected learning outcomes: See Norwegian version

Topic(s): See Norwegian version

Teaching Methods:

Lectures Laboratory work Net Support Learning Mandatory assignments

Form(s) of Assessment: Digital exam

Grading Scale: Alphabetical Scale, A(best) – F (fail)

Tillatte hjelpemidler:

Academic responsibility: Faculty of Computer Science and Media Technology

Emneansvarlig kobling: <u>Thomas Kemmerich</u>

Course responsibility: Førsteamanuensis Thomas Kemmerich

Publish: Yes



IMT3491 Ethical Hacking and Penetration Testing - 2015-2016

Course code: IMT3491

Course name: Ethical Hacking and Penetration Testing

Course level: Bachelor (syklus 1)

ECTS Credits: 5

Duration: Autumn

Language of instruction: English

Prerequisite(s): IMT2282 Operating systems

On the basis of: Master students must document that they have achieved learning outcomes equivalent to IMT2282 Operating systems

Expected learning outcomes:

Knowledge:

- Explain how a penetration test is planned, executed, documented and terminated.
- Account for vulnerabilities in general and common services running on internal and external servers for a generic company.
- Predict client side vulnerabilities and use the new methods for security breaches that may occur here.

Skills:

- Master the most common hacking and penetration testing tools and apply these tools to perform simple penetration testing tasks.
- Carry out structured and effective search for security issues in computer systems and computer networks.
- Construct effective penetration tests given existing threats towards software, networks, and network services.
- Use and abuse access to one system in order to gather more information about the networks and services used by this system.

General competence:

- Awareness of vulnerabilities in software both at server and client side, with an extra focus on network applications.
- Sensitivity for potential vulnerabilities in the computer systems and networks of a generic company, and ability to make an analysis of potential threats based on a network description.
- Overview of a wide set of tools for testing and accessing systems and networks.

Topic(s):

- Ethical hacking and penetration testing definitions
- Penetration testing methodologies
- Hands-on penetration testing

Teaching Methods:

Lectures Group works Laboratory work Exercises

Teaching Methods (additional text):

The course will be made accessible for both campus and remote students. Every student is free to choose the pedagogic arrangement form that is best fitted for her/his own requirement. The lectures in the course will be given on campus and are open for both categories of students. All the lectures will also be available on Internet through GUC's learning management system (Fronter).

Form(s) of Assessment:

Written exam, 2 hours Evaluation of Project(s) Digital exam



Form(s) of Assessment (additional text):

- Written OR digital exam (66%), depending on the number of students the exam might be oral
- Project work (34%)
- Both parts must be passed

Grading Scale: Alphabetical Scale, A(best) – F (fail)

External/internal examiner:

Evaluated by internal examiner. External examiner is used periodically (every four years, next time in 2014/2015).

Re-sit examination:

- No re-sit examination projects and exam are closely connected and related
- New project(s) and new exam(s) at next course dates

Tillatte hjelpemidler:

Examination support: None

Coursework Requirements:

One or two approved exercises, further information announced at course start.

Academic responsibility:

Faculty of Computer Science and Media Technology

Emneansvarlig kobling: Basel Katt

Course responsibility: Basel Katt

Teaching Materials:

Engebretson, P. (2013). The Basics of Hacking and Penetration Testing 2nd Ed.

Supporting literature

Regalado, D., Harris, S., Harper, A., Eagle, C., Ness, J., Spasojevic, B., Linn, R., Sims, S. (2015): Gray Hat Hacking The Ethical Hacker's Handbook 4th Ed.

Additional information:

In case there will be less than 5 students that will apply for the course, it will be at the discretion of the responsible for the study programme whether the course will be offered or not an if yes, in which form.

There will also be an upper limit to the class based on available laboratory resources.

Publish:



Elective course, 10 ECTS - 2015-2016

Course name: Elective course, 10 ECTS

Course level: Bachelor (syklus 1)

ECTS Credits: 10

Duration: Autumn and spring

Language of instruction: Norwegian

Expected learning outcomes:

Topic(s):

Teaching Methods: Group works

Form(s) of Assessment: Exercises

Grading Scale: Pass/Failure

Tillatte hjelpemidler:

Academic responsibility: Faculty of Technology, Economy and Management

Course responsibility:

Publish: Yes

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IMT3912 Bachelor's thesis - 2015-2016

Course code: IMT3912

Course name: Bachelor's thesis

Course level: Bachelor (syklus 1)

ECTS Credits: 20

Duration: Autumn and spring

Language of instruction: Norwegian

Prerequisite(s):

- The students must pass 100 ECTS credits before they can start working on the bachelor thesis.
- From autumn 2013: Idélab 24 or similar

Expected learning outcomes:

The bachelor thesis concludes the study and will combine important parts of the scientific content of the study program. After successful completion the students have acquired:

Knowledge:

- new knowledge in a part of the subject area chosen by the students
- an understanding of how to work in systematic ways, having reflective capabilities, and being able to conduct systematic/scientific assessments
- knowledge of the process of planning and conducting an independent piece of work, specifying problem to solve and analysing the identified problems based on theoretical as well as empirical data, and solve the problem in a methodologically acceptable way

Skills:

- skills in composing a problem statement of general interest within the subject area, under supervision
- skills in searching and identifying relevant scientific literature, under supervision
- skills in studying a delimited problem and developing alternative ways to solve the problem
- skills in documenting and presenting project results in a systematic/scientific way

General Competence:

- appreciation of scientific ethics; being capable of identifying ethical concerns of relevance for the chosen problem
- a consciousness of the impact the project may have on individuals, companies, and society

Topic(s):

The students choose a preapproved problem within the subject area.

Teaching Methods:

Project work Tutoring

Form(s) of Assessment:

Evaluation of Project(s)

Form(s) of Assessment (additional text):

For students attendiing Bachelor of Science in Engineering - Computer Science:

- The project report is given a temporary grade.
- Individual oral examination/presentation may adjust the grade up or down to the final grade, according to performance.
- Students must obtain a passing grade on the report to be able to present themselves for the oral examination/presentation.
- Students must pass both parts to pass the course
- For off campus students the oral exam will be arranged through web conference.

Grading Scale:

Alphabetical Scale, A(best) - F (fail)

External/internal examiner:

External and internal examiner

Re-sit examination:

After failure, a student may submit a new or a revised thesis once. If the student chooses to submit a revised version of the thesis, this must be submitted in the following semester.

Tillatte hjelpemidler:

Coursework Requirements:

- Problem description
- Project plan
- Written report signed by all project members
- Individual reflection notes
- Project presentation on Internet
- Project poster
- Oral presentation at the end of the project

Academic responsibility:

Faculty of Computer Science and Media Technology

Course responsibility: Hilde Bakke

Publish: Yes