

# Studieplan 2010/2011

## Master of Science in Information Security

### Studieprogramkode

MIS

### Innledning

Information technology permeates all aspects of society and has become critical to industry, government, and individual well-being. Securing these vital services and structures and the availability of trustworthy information whenever and wherever it is required has become both an area of intensive research and also of burgeoning commercial activity. A master of science in information security will provide the students with the knowledge and theoretical background as well as with the requisite skills and attitudes to succeed in this challenging yet eminently rewarding field.

[Go to course table](#)

### Studiets varighet, omfang og nivå

This is a two-year master program (120 ECTS credits) which is also available part-time over three or four years. The degree awarded upon completion is “Master of Science in Information Security”.

The program has three tracks: management, technology and digital forensics. Students have to choose which track they pursue when entering the program (see the course structure below).

The program qualifies students to proceed to Ph.D. studies.

### Forventet læringsutbytte

Upon completion of the programme, the students will have a solid understanding of the interdisciplinary field of information security. The graduated students will be proficient in core topics such as security management, computer and network security, incident responds and forensics, and will be able to understand the critical information infrastructures and the security aspects of important IT services which society depends on. The students will also have gained a particular in-depth understanding of either technology, forensics or management issues dependent on their chosen programme track.

The students will be capable of discussing main questions and issues in scientific thinking and will be able to frame research problems and questions. They will have experience in planning and conducting a scientific project and in documenting the results and scientific contributions in the form of a scientific report (through their master thesis).

### Målgruppe

There are three focus groups for this study programme:

1. Undergraduate students entering the programme as a continuation of their bachelor degree without any prior work experience.
2. Industry students (or students in private/public sector in general) looking for a full-time or part-time masters programme which is flexible and can be adapted to their employers needs and their own

individual needs.

3. International students: full-time, part-time or exchange students arriving for only single semesters.

### Opptakskrav og rangering

Applicants must have a bachelor degree in computer science or a related subject to qualify for admission. The applicants must document that they have at least 10 ECTS credits in mathematics/statistics and at least 60 ECTS credits in computer science subjects. A grade point average (GPA) of C is required. It is expected that within these credits the following topics have been covered:

- Structural and object-oriented programming
- Algorithms and data structures
- Databases and XML
- Software engineering
- Computer network (Data communication)
- Operating systems and computer architecture

Students who have not had a dedicated course in each of these topics need to be prepared for some extra studying when entering topics that require background knowledge with which they are not sufficiently familiar beforehand.

Graduate studies in information security require a somewhat different mathematical platform than the one included in most bachelor studies. To master the theoretical topics included in the master programme we therefore recommend that the students attend the preparatory courses in number theory and theoretical computer science offered during the first weeks of the fall semester.

### Studiets innhold, oppbygging og sammensetning

The programme is offered in a flexible manner to fit well to all the three target groups of students. In general, on campus presence is *required* only three times per semester (1-3 days each time), for a start-up session, for mid-term exams/presentations (and a start-up session of second part of the semester) and for final exams/presentations. Attendance is also strongly recommended for the *initial first two weeks of the programme when two preparatory intense short-courses in number theory and theoretical computer science are offered*. All courses are available online, but there will also be sessions on a regular weekly or bi-weekly schedule. The presence on these sessions is not required.

[More details for the upcoming year of study will be given here:](#)

The program has three tracks (paths of study): management, technology and digital forensics. Students have to choose which track they pursue when entering the programme. Common to all three tracks are a set of courses covering the core topics in both information security technology, forensics and management: introduction to cryptology, applied information security, network security, IT governance, information society and security, and legal aspects of information security. In addition, each track has a set of specific courses and the students have to choose at least 15 credits of courses from the track-specific pool of electives. Students also have to choose their master thesis topic within their chosen track.

Ordinary mandatory courses from the other track of the programme and courses from the masters programme in media technology and the CIMET (Color in Informatics and Media Technology) master can be included as electives. Students can also use *up to 20 ECTS of courses at the 3000 level* as part of their master programme, and are particularly encouraged to browse the course offerings of the

bachelor programmes in network and system administration, software engineering, and economics and management. Some of the courses listed above can also be mobile in time, space and teaching format upon request by students (typically a course can be taken in a different semester through self-study and individual or group supervision).

Master-level courses from other institutions can be included as electives or can substitute for mandatory courses at the discretion of the programme director.

The course structure for part-time students can be composed individually as long the track-specific requirements mentioned above and any course interdependencies are respected. The most important course interdependencies are the following: 1. Students should enter their master thesis in the semester following the research project planning course, 2. All previous course work has to be completed before entering the master thesis (an exception of 10 credits missing can be made at the discretion of the master thesis instructor, but only if the missing credits are not relevant for the topic of the master thesis).

Students entering the programme from the bachelors programme in information security will be offered greater flexibility in the course structure due to potential overlap with some of the contents in the bachelors programme.

### **Study methods**

- Lectures
- Exercises
- Project work
- Essay/Article writing
- Independent study
- Group exercises
- Lab exercises

### **Tekniske forutsetninger**

Students, who choose to participate in the study program on distance, need a relatively new computer and a broadband Internet connection. Software that is needed is mostly freely available on the Internet. In some courses commercial products, such as MatLab, are required.

For practical computer skills, it is expected that students can use any common operating system (GNU/Linux, Microsoft Windows, MacOS or Solaris) both with a graphical user interface and a command line interface.

Students who have not had a dedicated course on each of these topics should not worry, they just need to be prepared for a little bit of extra studying when entering topics that require background knowledge with which they are not sufficiently familiar beforehand.

Graduate studies in information security requires a somewhat different mathematical platform than the one included in most bachelor studies. To master the theoretical topics included in the master programme we therefore recommend that you attend the preparatory courses in number theory and theoretical computer science offered during the first two weeks of the fall semester.

### **Sensorordning**

Most courses have internal examiner. The master thesis always has an external examiner.

### Internasjonalisering

Students can travel abroad to do their master thesis. The information security group has strong links to many of the leading international academic groups within the field, and students are encouraged to contact their instructor in the course «research project planning» to ask for relevant travel opportunities.

### Klar for publisering

Ja

### Utdanningsnivå

Mastergrad

### Master of Science in Information Security 2010-2012 Technology full-time track

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester			
			S1(H)	S2(V)	S3(H)	S4(V)
IMT4421	<u>Vitenskapelige metoder</u>	O	5			
IMT4541	<u>Foundations of Information Security</u>	O	5			
IMT4532	<u>Cryptology 1</u>	O	5			
IMT4552	<u>Cryptology 2</u>	O	5			
IMT4571	<u>IT Governance</u>	O	5			
IMT4561	<u>Applied Information Security</u>	O	5			
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O		5		
IMT4581	<u>Nettverkssikkerhet</u>	O		10		
IMT4481	<u>Information Society and Security</u>	O		5		
	<u>Valgemne, 5 st.p.</u>	V		5		
	<u>Valgemne, 5 st.p.</u>	V		5		
IMT4601	<u>Research Project Planning</u>	O			5	
	<u>Valgemne, 5 st.p.</u>	V			5	
	<u>Valgemne, 5 st.p.</u>	V			5	
	<u>Valgemne, 5 st.p.</u>	V			5	
	<u>Valgemne, 5 st.p.</u>	V			5	
	<u>Valgemne, 5 st.p.</u>	V			5	
IMT4901	<u>Masteroppgave</u>	O				30
Sum:			30	30	30	30

\*) O - Obligatorisk emne, V - Valgbare emne

**Master of Science in Information Security 2010-2012 Digital Forensics full-time track**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester			
			S1(H)	S2(V)	S3(H)	S4(V)
IMT4421	<u>Vitenskapelige metoder</u>	O	5			
IMT4012	<u>Digital Forensics I</u>	O	5			
IMT4532	<u>Cryptology 1</u>	O	5			
IMT4571	<u>IT Governance</u>	O	5			
IMT4561	<u>Applied Information Security</u>	O	5			
IMT4022	<u>Digital Forensics II</u>	O		10		
IMT4581	<u>Nettverkssikkerhet</u>	O		10		
IMT4641	<u>Computational Forensics</u>	O		5		
IMT4612	<u>Machine Learning and Pattern Recognition I</u>	O		5		
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O		5		
IMT4601	<u>Research Project Planning</u>	O				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
IMT4901	<u>Masteroppgave</u>	O				30
		Sum:	25	35	30	30

\*) O - Obligatorisk emne, V - Valgbare emne

**Master of Science in Information Security 2010-2012 Management full-time track**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester			
			S1(H)	S2(V)	S3(H)	S4(V)
IMT4651	<u>Security as Continuous Improvement</u>	O	5			
IMT4661	<u>Security Management Dynamics</u>	O	5			
IMT4421	<u>Vitenskapelige metoder</u>	O	5			
IMT4561	<u>Applied Information Security</u>	O	5			
IMT4532	<u>Cryptology 1</u>	O	5			
IMT4571	<u>IT Governance</u>	O	5			
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O		5		
IMT4841	<u>Security Planning and Incident Management</u>	O		10		
IMT4581	<u>Nettverkssikkerhet</u>	O		10		
IMT4481	<u>Information Society and Security</u>	O		5		
IMT4601	<u>Research Project Planning</u>	O				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
	<u>Valgemne, 5 st.p.</u>	V				5
IMT4901	<u>Masteroppgave</u>	O				30
		Sum:	30	30	30	30

\*) O - Obligatorisk emne, V - Valgbare emne

**Master of Science in Information Security 2010-2013 Technology part-time track (three years)**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester					
			S1(H)	S2(V)	S3(H)	S4(V)	S5(H)	S6(V)
IMT4532	<u>Cryptology 1</u>	O	5					
IMT4552	<u>Cryptology 2</u>	O	5					
IMT4421	<u>Vitenskapelige metoder</u>	O	5					
IMT4571	<u>IT Governance</u>	O	5					
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O		5				
IMT4481	<u>Information Society and Security</u>	O		5				
IMT4581	<u>Nettverkssikkerhet</u>	O		10				
IMT4601	<u>Research Project Planning</u>	O			5			
IMT4541	<u>Foundations of Information Security</u>	O			5			
IMT4561	<u>Applied Information Security</u>	O			5			
	<u>Valgemne, 5 st.p.</u>	V			5			
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V					5	
	<u>Valgemne, 5 st.p.</u>	V					5	
IMT4904	<u>Master Thesis</u>	O					10	20
		Sum:	20	20	20	20	20	20

\*) O - Obligatorisk emne, V - Valgbare emne

**Master of Science in Information Security 2010-2013 Digital Forensics part-time track (three years)**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester					
			S1(H)	S2(V)	S3(H)	S4(V)	S5(H)	S6(V)
IMT4012	<u>Digital Forensics I</u>	O	5					
IMT4561	<u>Applied Information Security</u>	O	5					
IMT4532	<u>Cryptology 1</u>	O	5					
IMT4421	<u>Vitenskapelige metoder</u>	O	5					
IMT4581	<u>Nettverkssikkerhet</u>	O		10				
IMT4641	<u>Computational Forensics</u>	O		5				
IMT4612	<u>Machine Learning and Pattern Recognition I</u>	O		5				
IMT4571	<u>IT Governance</u>	O			5			
IMT4601	<u>Research Project Planning</u>	O			5			
	<u>Valgemne, 5 st.p.</u>	V			5			
	<u>Valgemne, 5 st.p.</u>	V			5			
IMT4022	<u>Digital Forensics II</u>	O				10		
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O				5		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V					5	
	<u>Valgemne, 5 st.p.</u>	V					5	
IMT4904	<u>Master Thesis</u>	O					10	20
		Sum:	20	20	20	20	20	20

\*) O - Obligatorisk emne, V - Valgbare emne

**Master of Science in Information Security 2010-2013 Management part-time track (three years)**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester					
			S1(H)	S2(V)	S3(H)	S4(V)	S5(H)	S6(V)
IMT4661	<u>Security Management Dynamics</u>	O	5					
IMT4651	<u>Security as Continuous Improvement</u>	O	5					
IMT4571	<u>IT Governance</u>	O	5					
IMT4421	<u>Vitenskapelige metoder</u>	O	5					
IMT4591	<u>Rettslige aspekter ved informasjonssikkerhet</u>	O		5				
IMT4481	<u>Information Society and Security</u>	O		5				
IMT4841	<u>Security Planning and Incident Management</u>	O		10				
IMT4601	<u>Research Project Planning</u>	O			5			
IMT4561	<u>Applied Information Security</u>	O			5			
IMT4532	<u>Cryptography I</u>	O			5			
	<u>Valgemne, 5 st.p.</u>	V			5			
IMT4581	<u>Nettverkssikkerhet</u>	O				10		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V				5		
	<u>Valgemne, 5 st.p.</u>	V					5	
	<u>Valgemne, 5 st.p.</u>	V					5	
IMT4904	<u>Master Thesis</u>	O					10	20
		Sum:	20	20	20	20	20	20

\*) O - Obligatorisk emne, V - Valgbare emne

**Electives**

Emnekode	Emnets navn	O/V *)	Studiepoeng pr. semester	
			S1(H)	S2(V)
IMT3491	<u>Ethical Hacking and Penetration Testing</u>	V	5	
IMT3761	<u>Informasjonskrigføring</u>	V	5	
IMT3551	<u>Digital Forensics</u>	V	5	
IMT4882	<u>Fordypningsemne II</u>	V	10	10
IMT4721	<u>Autentisering</u>	V	5	
IMT4632	<u>Machine Learning and Pattern Recognition II</u>	V	5	
IMT4671	<u>Organizational and Human Aspects of Information Security</u>	V	5	
IMT4772	<u>Risk Management II</u>	V	5	
IMT4881	<u>Fordypningsemne</u>	V	5	5
IMT4741	<u>Intrusion detection and prevention</u>	V	5	
IMT4751	<u>Wireless communication security</u>	V	5	
IMT4762	<u>Risk Management I</u>	V	5	
IMT3511	<u>Discrete Mathematics</u>	V		10
IMT4621	<u>Biometrics</u>	V		5
IMT4612	<u>Machine Learning and Pattern Recognition I</u>	V		5
IMT4641	<u>Computational Forensics</u>	V		5
		Sum:	0	0

\*) O - Obligatorisk emne, V - Valgbare emne

## Emneoversikt

### IMT4651 Security as Continuous Improvement - 2010-2011

**Emnekode:**

IMT4651

**Emnenavn:**

Security as Continuous Improvement

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forutsetter bestått:**

IMT4661 - Security Management Dynamics

**Forventet læringsutbytte:**

Already the BS7799/ISO17799 standards encouraged viewing security as quality improvement. Some years later and after the extensions to the ISO27000 family, security as a continuous improvement process is not yet a mainstream activity.

The emphasis of this course is on identifying the systemic obstacles in the implementation path of continuous improvement of processes (“the quality improvement paradox”). Then, to apply this insights to redesign security management to achieve continuous improvement.

**Emnets temaer:**

The quality improvement paradox

Security and quality improvement processes

Improving the Performance of Computer Security Incident Response Teams (CSIRTs)

Incident reporting systems and Learning from incidents

Security risks in the transition to Integrated Operations

Security-dependent safety. Continuous improvement of security in Critical Infrastructure



**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning  
Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Web-enabled course with forum

**Vurderingsformer:**

Flervalgstest(er)  
Vurdering av prosjekt(er)

**Vurderingsformer:**

- Two multiple choice exams counting each 15%
- Two individual projects (papers) counting each 35%
- Each part must be individually approved of

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

The whole subject must be repeated

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

The course requires active participation in projects – both in class and outside class.

Hands-on modelling exercises during class are best carried out in computer lab.

Students are encouraged to bring laptops to the classroom.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Jose Gonzalez

**Læremidler:**

Written material will be given/sent to the students during the semester.

**Klar for publisering:**

Ja

## IMT4661 Security Management Dynamics - 2010-2011

**Emnekode:**

IMT4661

**Emnenavn:**

Security Management Dynamics

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Første halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

The emphasis of this course is on the *dynamics* of security management. This is a much neglected aspect that it is becoming increasingly important.

Security is a highly interdisciplinary challenge, involving Man, Technology and Organization – the famous MTO challenge. Some people would add Economics as a new and important aspect.

Addressing the dynamics of security management provides several bonuses:

- Understand why many managers fail to achieve a satisfactory state of security;
- understand why some important security failures occur as unintended side-effects of management actions;
- and others, such as the increasing importance of employing System Dynamics to manage dynamic complexity.

**Emnets temaer:**

Foundations – Security standards from the perspective of change and dynamics

Introduction to qualitative system dynamics: Causal loop diagrams; System archetypes

Modelling security management dynamics using system archetypes and causal loop diagrams

Introduction to quantitative system dynamics: Causal structure and dynamic behaviour. Introduction to stocks and flows. Time delays.

Basic system dynamics models of security management.

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning  
Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Web-enabled course with forum

**Vurderingsformer:**

Flervalgstest(er)  
Vurdering av prosjekt(er)

**Vurderingsformer:**

- Two multiple choice exams counting each 15%
- Two individual projects (papers) counting each 35%
- Each part must be individually approved of

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

The whole subject must be repeated.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

The course requires active participation in projects – both in class and outside class.

Hands-on modelling exercises during class are best carried out in computer lab.

Students are encouraged to bring laptops to the classroom.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Jose Gonzalez

**Læremidler:**

Literature:

Maani, Kambiz E.; Cavana, Robert Y. Systems Thinking And Modelling. Pearson Education. 9781877371035.

Lectures, exercises and projects by Jose J. Gonzalez in Classfronter

**Erstatter:**

IMT4111 Sikkerhetsledelse

**Klar for publisering:**

Ja

## IMT4421 Vitenskapelige metoder - 2010-2011

**Emnekode:**

IMT4421

**Emnenavn:**

Vitenskapelige metoder

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Etter endt emne skal studenten kjenne til og kunne drøfte sentrale spørsmål og problemstillinger innen vitenskapsteori. Studenten skal etter endt emne være i stand til å definere en vitenskapelig problemstilling, kunne planlegge gjennomføringen av et vitenskapelig arbeid og kunne rapportere resultater fra vitenskapelige prosjekter.

**Emnets temaer:**

- Introduksjon til vitenskapsteori
- Hva kjennetegner god forskning
- Forskningsetikk
- Kvantitative og kvalitative forskningsdesign
- Hva karakteriserer gode problemstillinger og hvordan lager man en?
- Litteraturstudier
- Metodevalg, inkludert planlegging, gjennomføring, og analyse av eksperimenter/studier.
- Behandling av data/statistikk
- Utarbeidelse av prosjektplan
- Gjennomføring av risikoanalyse og gjennomførbarhetsanalyse
- Tekniske rapporter, oppbygging og innhold

**Pedagogiske metoder:**

Essay  
Forelesninger  
Nettbasert Læring  
Prosjektarbeid  
Veiledning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern og ekstern sensor.

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontiunasjonseksamen.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Engelsk ordbok.

**Obligatoriske arbeidskrav:**

Godkjent essay

Gjennomført praktisk prosjekt

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førstelektor Frode Volden

**Læremidler:**

Leedy, P D, and Ormrod, J E: "Practical Research, -Planning and design, 8th ed."Pearsopn Educational Int. ISBN: 0-13-124720-4

Samt tilleggs litteratur, utdelt eller gjort tilgjengelig i Fronter.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4421>

## IMT4561 Applied Information Security - 2010-2011

**Emnekode:**

IMT4561

**Emnenavn:**

Applied Information Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Students who have passed this course should:

- have acquired good knowledge of the common terminology in information security
- have working knowledge of security analysis methods
- have a good understanding of selected attack mechanisms and techniques and their employment by malicious software
- have working knowledge of database security
- have good understanding of design principles for secure information systems

**Emnets temaer:**

- Core terminology for information security
- Authentication and authentication techniques
- Security analysis methods
- Design principles for secure information systems
- Case studies of secure system design
- Database security
- Attack mechanisms and techniques
- Malicious software

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning  
Prosjektarbeid  
Annet

**Pedagogiske metoder (fritekst):**

Annet - Tutorials

**Vurderingsformer:**

Annet

**Vurderingsformer:**

Written examination, 3 hours, (2/3) in conjunction with term paper (1/3). Pass decision is on the cumulative grade.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer.

**Utsatt eksamen (tidl. kontinuasjon):**

A new term paper must be provided next autumn. For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Simple calculator

**Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Stephen Wolthusen

**Læremidler:**

Books:

- M. Bishop: Computer Security: Art and Science. Addison-Wesley, Reading, MA, USA (2002)
- D. Gollmann: Computer Security, 2nd ed. John Wiley & Sons, New York, NY, USA (2006)
- M. Gasser: Building a Secure Computer System. Van Nostrand Reinhold, New York, NY, USA (1988)
- R. Anderson: Security Engineering: A Guide to Building Dependable Distributed Systems. John Wiley & Sons, Chichester, UK (2001)
- A. K. Jain, P. J. Flynn, and A. A. Ross: Handbook of Biometrics. Springer-Verlag, Berlin, Germany (2007).

**Erstatter:**

IMT4162 Information Security and Security Architecture

**Klar for publisering:**

Ja



## IMT4532 Cryptology 1 - 2010-2011

**Emnekode:**

IMT4532

**Emnenavn:**

Cryptology 1

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Første halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

In the course the students will acquire:

- Advanced level of understanding of methods of analysis and synthesis of cryptographic systems
- Deep understanding of modern cryptographic theory

**Emnets temaer:**

1. Classical cryptography
2. Symmetric ciphers
3. Asymmetric ciphers
4. Hash functions and digital signatures.

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Calculator, dictionary

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Slobodan Petrovic

**Læremidler:**

Books:

1. Introduction to Cryptography and Coding Theory, 2. edition, Trappe W., Washington L., Prentice Hall, 2006, ISBN: 0131981994.

2. Handbook of Applied Cryptography, Menezes A., <http://www.cacr.math.uwaterloo.ca/hac>

**Erstatter:**

IMT4531 Introduction to Cryptology

**Supplerende opplysninger:**

There is room for 50 students for the course.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4532>

## IMT4571 IT Governance - 2010-2011

**Emnekode:**

IMT4571

**Emnenavn:**

IT Governance

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Calder and Watkins define IT Governance as "the framework for the leadership, organizational structures and business processes, standards and compliance to these standards, which ensures that the organization's information systems support and enable the achievement of its strategies and objectives". IT Governance is of crucial importance for organizations owing to the need to best safeguard critical information and, through the increasing requirements from national and international regulations. Central to IT Governance in Europe is the ISO 27001 / ISO 27002 standard.

This course provides an overview of IT Governance and the basic concepts of the ISO 27001 / ISO 27002 standard.

The candidate should after attending the course

- fully understand the main principles of IT Governance.
- fully understand the basic concepts of the ISO 27001 / ISO 27002 standard
- master the principles for designing & implementing an ISO 27001 ISMS
- be fully aware of the difference between security technology and the management of secure systems
- have a thorough understanding of security management as a continuous improvement process.
- possess awareness of security certification schemes (BS7799, ISO 15408, ...)

**Emnets temaer:**

- Reasons for IT Governance: Compliance, liability, stability
- Organizing information security
- Information security policy and scope
- The risk assessment and statement of applicability
- Identification of risks related to external parties
- Asset management
- Human resources security
- Physical and environmental security
- Equipment security
- Communications and operations management
- Controls against malicious software (malware) and back-ups
- Network security management and media handling
- Exchanges of information
- Electronic commerce services
- E-mail and internet use
- Access control
- Network access control
- Operating system access control
- Application access control and teleworking
- Systems acquisition, development and maintenance
- Cryptographic controls
- Security in development and support processes
- Monitoring and information security incident management
- Business continuity management
- Compliance
- Principles of auditing

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

Lectures, exercises and projects.

**Vurderingsformer:**

Annet

**Vurderingsformer:**

- 1-2 Multiple Choice Tests (weight: 20%)
- 1-2 group Assignments (weight: 30%)
- Digital Final exam, 2 hours (weight: 50%)
- All three parts are mandatory and must be passed!

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

For the final exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Forskningssjef Åsmund Skomedal

**Læremidler:**

Literature:

Alan Calder & Steve Watkins. IT Governance : IT Governance: A Manager's Guide to Data Security and ISO 27001 / ISO 27002. Fourth Edition. Kogan Page. 2008.

Anderson, Ross (1999) Why cryptosystems fail, University Computer Laboratory, University of Cambridge, Cambridge, UK, <http://www.cl.cam.ac.uk/~rja14/wcf.html>.

**Klar for publisering:**

Ja

## **IMT4591 Rettslige aspekter ved informasjonssikkerhet - 2010-2011**

**Emnekode:**

IMT4591

**Emnenavn:**

Rettslige aspekter ved informasjonssikkerhet

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Språk:**

Norsk, alternativt engelsk

**Forventet læringsutbytte:**

Etter fullført emne skal studentene være i stand til å redegjøre for rettslige forhold som er særlig relevante for arbeidet med informasjonssikkerhet. Dette gjelder spesielt den rettslige reguleringen av forhold som har betydning for ivaretagelse av konfidensialitet, integritet, tilgjengelighet og kvalitet.

**Emnets temaer:**

Generelle bestemmelser om informasjonssikkerhet, særlig innenfor e-forvaltning

Sikring av personopplysninger ved innsamling, bearbeiding og lagring av opplysninger

Regler for elektronisk kommunikasjon

**Pedagogiske metoder:**

Forelesninger

Gruppearbeid

Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern + ekstern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon

**Tillatte hjelpemidler:**

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Lise Nilsen

**Læremidler:**

Se oversikt i emnets rom i Fronter.

**Klar for publisering:**

Ja

## IMT4841 Security Planning and Incident Management - 2010-2011

**Emnekode:**

IMT4841

**Emnenavn:**

Security Planning and Incident Management

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Vår

**Språk:**

Norsk, alternativt engelsk

**Forventet læringsutbytte:**

Studenten skal etter endt emne være i stand til å utarbeide policier og prosedyrer for beredskapsplaner, samt lede planleggingsprosessen. Studenten må derfor oppnå god forståelse av hvorfor hendelsesrapporteringssystemer bør være på plass, hvordan de fungerer og hvordan man planlegger og gjennomfører etterforskning. Videre bør studenten ha god oversikt over kjente problemer innen hendelsesrapporteringssystemer. Studenten bør også være i stand til å planlegge for og håndtere større og mindre katastrofer. I forbindelse med katastrofer må studenten også ha oversikt over hvordan man planlegger for å holde driften i gang.

**Emnets temaer:**

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

**Pedagogiske metoder:**

Forelesninger

Prosjektarbeid

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

Vurdering av prosjekt(er)



**Vurderingsformer:**

Totalvurdering bestående av 100 poeng hvorav 50 poeng kan oppnåes på prosjektarbeide og 50 poeng (minst 18 MÅ oppnås) på avsluttende 3-timers eksamen. Omregning fra 100-poengskala til A-F-skala skjer i henhold til anbefalt omregningstabell, men emneansvarlig kan i spesielle tilfeller gjøre små justeringer av grenser for å sikre overenstemmelse med de kvalitative beskrivelsene på A-F-skalaen.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Ekstern sensurering

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon på skriftlig eksamen

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Ordbok: Engelsk-Norsk eller Engelsk til annet språk

**Obligatoriske arbeidskrav:**

Et prosjekt må gjennomføres (eksamensprosjektet).

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Finn Olav Sveen

**Læremidler:**

Michael Whitman og Herbert Mattord: Principles of Incident Response and Disaster Recovery. Thomson, 2007.

Tillegglitteratur vil bli utdelt.

**Erstatter:**

IMT5161 - Incident response and computer forensics

**Klar for publisering:**

Ja

## IMT4581 Nettverkssikkerhet - 2010-2011

**Emnekode:**

IMT4581

**Emnenavn:**

Nettverkssikkerhet

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Vår

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

Noe kjennskap til kryptologi

**Forventet læringsutbytte:**

Se engelsk versjon

**Emnets temaer:**

Se engelsk versjon

**Pedagogiske metoder:**

Essay

Forelesninger

**Vurderingsformer:**

Annet

**Vurderingsformer:**

Totalvurdering bestående av 100 poeng hvorav 50 poeng kan oppnåes på essay og 50 poeng på 3-timers skriftlig eksamen. Omregning fra 100-poengskala til A-F-skala skjer i henhold til anbefalt omregningstabell, men emneansvarlig kan i spesielle tilfeller gjøre små justeringer av grenser for å sikre overenstemmelse med de kvalitative beskrivelsene på A-F-skalaen.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon på skriftlig eksamen

**Tillatte hjelpemidler:**

**Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Ingen

**Obligatoriske arbeidskrav:**

Ingen

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor II Jan Audestad

**Læremidler:**

Kompendium forfattet av emneansvarlig, tilgjengelig via Fronter.

**Erstatter:**

IMT4101 Sikkerhet i distribuerte systemer

**Supplerende opplysninger:**

Emnet har plass til max. 50 studenter

**Klar for publisering:**

Ja

## IMT4481 Information Society and Security - 2010-2011

**Emnekode:**

IMT4481

**Emnenavn:**

Information Society and Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Varighet (fritekst):**

Første halvdel av semesteret.

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Studentene skal primært forstå hvorfor utviklingen de siste ti årene innen IKT har ført til et meget sårbart samfunn og hva denne sårbarheten består i. De skal få nok forståelse i emnet til at de kan identifisere, vurdere verdien av og iverksette tiltak til beskyttelse av bedrifter og foretak.

Dette omfatter forståelse for:

- hvordan IKT-systemer er bygget opp og inngår i industriell produksjon, i offentlig og privat tjenesteyting, i offentlig administrasjon og i samfunnets infrastruktur
- hvorfor IKT-systemer og administrativ infrastruktur kan beskrives som skalafrie nettverk, og hva dette har å si for sårbarhet og robusthet
- klassisk pålitelighetsteori, inklusivt pålitelighet av programvare og nettverk.

**Emnets temaer:**

- Innføring i begrepet risiko slik det er brukt i teknologi, forsikring og finans.
- Årsaker som bidrar til øket risiko: overoptimistisk fokus på markedsvekst, manglende tallforståelse og innsikt i statistikk og sannsynlighetsregning og teoriene til Kahneman og Tversky (forankring og prospektteori).
- Oppbygning og virkemåte av distribuerte IKT-systemer, herunder telekommunikasjonsteknologi og distribuert prosessering.
- Klassisk pålitelighetsteori for maskinvare og programvare.
- Teorien for tilfeldige (random) grafer (nettverk) og deres egenskaper med særlig vekt på egenskapene til skalafrie grafer.
- Sentrale begreper fra kombinatorisk kompleksitet og beregnbarhet gjennomgå.
- Identifisering av skalafrie nettverk i samfunnet (tekniske, administrative og sosiale) og deres betydning for samfunnets sårbarhet.

**Pedagogiske metoder:**

Forelesninger

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Rettes av emnelærer(e)

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Ingen

**Obligatoriske arbeidskrav:**

Ingen

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Jan Arild Audestad

**Læremidler:**

Jan A Audestad, *E-Bombs and E-Grenades: The Vulnerability of the Computerized Society*, HiG, 2009  
(tilgjengelig via Fronter)

-Utdelte artikler

**Erstatter:**

IMT4151 - Samfunnets sårbarhet

**Klar for publisering:**

Ja

## IMT4601 Research Project Planning - 2011-2012

**Emnekode:**

IMT4601

**Emnenavn:**

Research Project Planning

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

Vår

**Varighet (fritekst):**

The course is offered in the autumn. However, for the spring semester, students can do the course as supervised self study without any lectures, subject to the availability of a supervisor.

**Språk:**

Engelsk

**Forutsetter bestått:**

IMT 4421 Scientific methodology

**Forventet læringsutbytte:**

The Pre-project shall prepare the students to complete their master thesis on time, and with the expected quality.

The course contributes towards the following learning outcomes:

***Knowledge***

- Possesses advanced knowledge within the area covered by the Master Programme.
- Possesses specialized insight and good understanding of the research frontier in a selected part of the topic covered by the Master Programme.
- Possesses thorough knowledge of professional and scientific theory and methodology of relevance to the topics covered by the Master Programme.
- Is able to apply the knowledge and understanding from the topics covered by the Master Programme to new and unfamiliar settings.

***Skills***

- Is able to handle theoretical issues, and solve complex practical problems, independently in the area covered by the Master Programme.
- Is able to use relevant and suitable methods when carrying out research and development activities in the area covered by the Master Programme.
- Is able to critically review relevant literature when solving new or complex problems and is able to integrate the findings into the proposed solution.
- Is able to plan and complete an independent and limited research or development project with guidance and in adherence to research ethics.

***General competence***

- Is able to analyze relevant ethical issues (technological, professional, and scientific)

Having completed the course, the students should have acquired:

- An understanding of academic writing style and documentation structure.
- The ability to formulate a research problem and research questions.
- An understanding of ethical issues in research.

**Emnets temaer:**

1. Problem description and choice of methods
2. Identifying, collecting and structuring published research results relevant for the project. Use of library resources
3. Project planning

**Pedagogiske metoder:**

Forelesninger

**Pedagogiske metoder (fritekst):**

There are no lectures in the spring semester.

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Vurderingsformer:**

Mid term report counts 30%. Final report counts 70%. Each student must hand in his/her own individual report.

To ensure fairness, course deliverable grading will depend on deliverable quantity, quality and the number of contributing students.

Scores can be normalized at the discretion of the instructor/examiner.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Internal examiner will assess the mid term report. The supervisor is required to provide input to the mid term assessment process.

External and internal examiner on the final report.

**Utsatt eksamen (tidl. kontinuasjon):**

The whole course must be repeated.

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Einar Snekkenes

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4601>



## Valgemne, 5 st.p. - 2010-2011

**Emnenavn:**

Valgemne, 5 st.p.

**Faglig nivå:**

Bachelor (syklus 1)

**Studiepoeng:**

5

**Varighet:**

Høst og vår

**Språk:**

Norsk

**Forventet læringsutbytte:**

.

**Emnets temaer:**

.

**Pedagogiske metoder:**

Gruppearbeid

**Vurderingsformer:**

Øvinger

**Karakterskala:**

Bestått/Ikke bestått

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for teknologi, økonomi og ledelse

**Emneansvarlig:**

.

**Klar for publisering:**

Nei

## IMT4901 Masteroppgave - 2011-2012

**Emnekode:**

IMT4901

**Emnenavn:**

Masteroppgave

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

30

**Varighet:**

Høst

Vår

**Varighet (fritekst):**

Se engelsk beskrivelse.

**Språk:**

Norsk, alternativt engelsk

**Forutsetter bestått:**

Se engelsk beskrivelse.

**Forventet læringsutbytte:**

Se engelsk beskrivelse.

**Emnets temaer:**

Se engelsk beskrivelse.

**Pedagogiske metoder:**

Prosjektarbeid

Samling(er)/seminar(er)

Veiledning

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Vurderingsformer:**

Se engelsk beskrivelse.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Se engelsk beskrivelse.

**Utsatt eksamen (tidl. kontinuasjon):**

Se engelsk beskrivelse.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

Se engelsk beskrivelse.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Prodekan/Vicedean Rune Hjelsvold

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4901>

## IMT3491 Ethical Hacking and Penetration Testing - 2011-2012

**Emnekode:**

IMT3491

**Emnenavn:**

Ethical Hacking and Penetration Testing

**Faglig nivå:**

Bachelor (syklus 1)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

IMT2282 Operating systems

**Forventet læringsutbytte:**

The course will address the methodology of penetration testing, learning how penetration tests are constructed and experimenting with penetration testing tools in the laboratory. The course will look at vulnerabilities in software both at server and client side, with a high focus on network applications.

The students should after the end of the course have a good overview of how an effective penetration test should take place and of the threats that exists towards software, networks, and network services. A deeper analysis and a set of practical exercises will be the foundation for a deeper understanding into some specific security vulnerabilities that exists.

**Emnets temaer:**

- Ethical Hacking and Penetration Testing – definitions
- Penetration Testingx” Methodologies
- Password attacks
- Privilege escalation
- Network mapping
- Software vulnerabilities
- Web application problems
- XSS, parameters, persistence
- SQLinjection
- Data mining
- Fuzzing

**Pedagogiske metoder:**

Forelesninger  
Gruppearbeid  
Lab.øvelser  
Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 2 timer  
Vurdering av prosjekt(er)

**Vurderingsformer:**

- Written exam (51%), depending on the number of student the exam might be oral
- Project (49%)
- Both parts must be passed

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluation by internal and external examiner

**Utsatt eksamen (tidl. kontinuasjon):**

- Ordinary re-sit examination
- New project(s) at next course dates

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

None

**Obligatoriske arbeidskrav:**

2 approved exercises

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førsteamanuensis Lasse Øverlier

**Læremidler:**

Articles and book chapters. Specifics to be announced at course start.

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT3761 Informasjonskrigføring - 2011-2012

**Emnekode:**

IMT3761

**Emnenavn:**

Informasjonskrigføring

**Faglig nivå:**

Bachelor (syklus 1)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Norsk

**Forventet læringsutbytte:*****Kunnskap***

- Forklare hva informasjonskrigføring er
- Formulere hvordan informasjonskrigføring benyttes i krigføring, terrorisme og kriminalitet
- Gjøre rede for hvordan næringsliv og offentlig sektor kan beskytte seg mot informasjonskrigføring

***Ferdigheter***

- Følge reelle informasjonsoperasjoner
- Avsløre og gjenkjenne forsøk på psykologisk manipulasjon
- Velge indikatorer for å påvise at man er utsatt for informasjonskrigføring
- Planlegge og tilrettelegge for beskyttelse av bedrifter eller organisasjoner mot informasjonskrigføring

***Generell kompetanse***

- Anerkjennelse av samfunnets avhengighet av informasjonssystemer og at denne avhengigheten gjennom psykologisk manipulering, etterretning og målrettet ødeleggelse kan brukes til å utøve makt overfor enkeltpersoner, grupper og nasjonalstater
- Ta ansvar for beskyttelse av bedrifter eller organisasjoner i tråd med juridiske føringer

**Emnets temaer:**

- Informasjonskrigføringens terminologi og innhold
- Cyber space som operasjonsmiljø
- Våpen som brukes i informasjonskrigføring
- Introduksjon til psykologien bak manipulering
- Kunnskapsledelse (knowledge management)
- Verdivurdering
- Kunnskapsbaserte cyber-operasjoner

**Pedagogiske metoder:**

Forelesninger  
Gruppearbeid

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

Rapporter

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Major Roger Johnsen

**Læremidler:**

Bøker:

- 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)

**Supplerende opplysninger:**

Emnet har plass til max. 30 studenter.

**Klar for publisering:**

Ja

## IMT3551 Digital Forensics - 2011-2012

**Emnekode:**

IMT3551

**Emnenavn:**

Digital Forensics

**Faglig nivå:**

Bachelor (syklus 1)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Norsk, alternativt engelsk

**Anbefalt forkunnskap:**

- IMT2282- Operativsystemer
- IMT2431- Datakommunikasjon og nettverkssikkerhet

**Forventet læringsutbytte:**

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.

**Emnets temaer:**

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

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

**Vurderingsformer:**

Annet



**Vurderingsformer:**

An overall evaluation based on a 100 point scale, where project work counts 40 points, oral presentation counts 20%, and final exam (3 hours) counts 40 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.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern og ekstern sensor sensurerer alle besvarelsene

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon på skriftlig eksamen

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Ingen

**Obligatoriske arbeidskrav:**

Oppgis ved semesterstart

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Associate Professor André Årnes (andre.arnes@hig.no)

**Læremidler:**

- Dan Farmer and Wietse Venema: Forensic Discovery, Addison-Wesley, 2005
- Presentation material and 5 selected papers

**Erstatter:**

IMT3711 Digital Forensic Science

**Supplerende opplysninger:**

Kjennskap til Linux er en fordel

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4882 Fordypningsemne II - 2011-2012

**Emnekode:**

IMT4882

**Emnenavn:**

Fordypningsemne II

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Høst

Vår

**Varighet (fritekst):**

Can run any time during the full year.

**Språk:**

Engelsk

**Forutsetter bestått:**

Must be determined by the supervisor based upon the particular assignment.

**Forventet læringsutbytte:**

The student will learn how to master a particular topic individually

**Emnets temaer:**

The student and the supervisor will agree on a topic together. The supervisor is responsible for the fact that the workload for the student should be equivalent to a 10 ECTS course. The student will work as much as possible independently with some supervision by the supervisor.

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

The teaching methods depend on the particular topic agreed upon by the student and the supervisor

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Could be both internal and external.

**Utsatt eksamen (tidl. kontinuasjon):**

The whole course must be repeated.

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førsteamanuensis Patrick Bours

**Læremidler:**

Depending on the particular agreed upon topic

**Supplerende opplysninger:**

This course is intended for students who want to work independently on a particular topic of his/her interest. The student needs to find a supervisor by him/herself. The supervisor and the student will need to agree on a topic together. Topics can be for example (list is not exclusive):

- \* studying a particular topic from literature
- \* investigating a particular open research problem
- \* performing experiments on a research topic

In general the student will write a report on his studies or findings that can be evaluated either by the supervisor or by an external examiner. Another option for the evaluation could be writing an article for a publication or a presentation at a conference or an oral exam with the supervisor or a third person.

Students are not allowed to take both IMT4881 Specialization course 5 ECTS and IMT4882 Specialization course II 10 ECTS (either IMT4881 or IMT4882).

**Klar for publisering:**

Ja

## IMT4721 Autentisering - 2011-2012

**Emnekode:**

IMT4721

**Emnenavn:**

Autentisering

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Etter endt emne har studenten økt forståelse av

- ulike autentiseringsmetoder f eks passord/pin, ganglag, signatur, tastetrykk-dynamikk, tokenbaserte løsninger.
- evaluering av autentiseringsmetoder med hensyn til sikkerhetsmessig styrke

**Emnets temaer:**

- Autentisering i en sikkerhetskontekst. Hva er rimelige antagelser med hensyn på opponentens kapabiliteter.
- Utvalgte autentiseringsteknikker som f eks passord/pin, ganglag, signatur, tastetrykk-dynamikk, tokenbaserte løsninger.
- Teknikker for å evaluere autentiseringsmetoder

**Pedagogiske metoder:**

Forelesninger

Prosjektarbeid

Veiledning

**Vurderingsformer:**

Annet

**Vurderingsformer:**

Totalvurdering bestående av 100 poeng hvorav 50 poeng på prosjektarbeide og 50 poeng på avsluttende eksamen (3 timer). Omregning fra 100-poengskala til A-F-skala skjer i henhold til anbefalt omregningstabell, men emneansvarlig kan i spesielle tilfeller gjøre små justeringer av grenser for å sikre overenstemmelse med de kvalitative beskrivelsene på A-F-skalaen.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern sensor.

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon på skriftlig eksamen.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Godkjent kalkulator

**Obligatoriske arbeidskrav:**

Ingen

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førsteamanuensis Patrick Bours

**Læremidler:**

Det eksisterer et kompendium skrevet av professoren som tildeles ved begynnelse av kurset.

**Erstatter:**

IMT5072 - Autentisering

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/is/courses/imt4721>

## **IMT4632 Machine Learning and Pattern Recognition II - 2011-2012**

**Emnekode:**

IMT4632

**Emnenavn:**

Machine Learning and Pattern Recognition II

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Første halvdel av semesteret

**Språk:**

Engelsk

**Forutsetter bestått:**

IMT4612 Machine Learning and Pattern Recognition I

**Forventet læringsutbytte:**

Se engelsk versjon

**Emnets temaer:**

Se engelsk versjon

**Pedagogiske metoder:**

Forelesninger

Gruppearbeid

Lab.øvelser

Oppgaveløsning

Annet

**Pedagogiske metoder (fritekst):**

Se engelsk versjon

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

Annet

**Vurderingsformer:**

Se engelsk versjon

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Se engelsk versjon

**Utsatt eksamen (tidl. kontinuasjon):**

Se engelsk versjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Se engelsk versjon

**Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke

**Læremidler:**

Se engelsk versjon

**Supplerende opplysninger:**

Se engelsk versjon

**Klar for publisering:**

Ja

## IMT4671 Organizational and Human Aspects of Information Security - 2011-2012

**Emnekode:**

IMT4671

**Emnenavn:**

Organizational and Human Aspects of Information Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

First half of semester

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

Basic understanding of risk analysis and risk assessment. Basic knowledge in technical configuration of security devices such as firewall, IDS, IAM etc.

**Forventet læringsutbytte:**

In general, this course gives a very practical view of the main task of a corporate security office. The experience of the security office of more than five fortune 500 enterprises is woven in the content and exercises and project work. The influence of the corporate security office on security implementation and configuration will be studied using typical real situations.

Having completed the course, the student should have

- A sound understanding of corporate organisations and policies, and how the security is embedded into organisation, processes and corporate documentation framework. He/she will be able to plan the set of required security documentations and to implement enterprise specific security organisation and security policies
- an understanding practical awareness and the ability to plan a corporate awareness campaign
- an understanding of security culture and its meaning. The student will be enabled to describe a target security culture and to make an implementation plan for a turn around
- the ability to distinguish between responsibility and delegation. The student will be enabled to provide security in an unfriendly environment with budget constraints and “lack of enthusiasm” for security.
- an understanding of security strategy, security innovation process and its implementation.
- an understanding of future research topic identification and its processes as implemented in European Commission ([www.parsicfalproject.eu](http://www.parsicfalproject.eu) [www.ci2rco.org](http://www.ci2rco.org) )



**Emnets temaer:**

The course will cover a selection the following or similar topics

- overview of practical information security management with special focus on human and organisational aspects
- case studies of practical information security policy, strategy, culture, organisation
- defining the various key roles in corporate security management and how they interact
- planning of key elements of corporate security framework
- Security innovation process in enterprises and research.

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

Lectures, seminars or guided self study, role games, project work, depending on the number of students: Term paper(s)

**Vurderingsformer:**

Muntlig, individuelt

Annet

**Vurderingsformer:**

- Oral examination: for 20-25 minutes, if the number of students is too big, it will be turned to a written exam: (65%)
- Term paper(s): (35%)
- Pass decision is on the cumulative grade.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

A new term paper must be provided and the examination must be re-sat.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

Two presentation in respect to the term paper will take place during the semester:

- In the second week each students presents a concept of the term paper (content), the methodical approach and the resources which will be used during work. Presentation lasts 5 Minutes. Each student will receive comments from the class and the teacher.
- In the last lectures of the Semester a presentation of the term paper (about 30 minutes) as a coaching for a mini presentation at the oral exam is given by the students.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Prof. Bernhard Hammerli

**Læremidler:**

TBA

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4772 Risk Management II - 2011-2012

**Emnekode:**

IMT4772

**Emnenavn:**

Risk Management II

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

The course contributes towards the following learning outcomes:

***Knowledge***

- Possesses advanced knowledge within the area covered by the Master Programme.
- Possesses specialized insight and good understanding of the research frontier in a selected part of the topic covered by the Master Programme.

***Skills***

- Is able to analyze existing theories, methods and interpretations and to challenge established knowledge and practice in the media technology area.
- Is able to use relevant and suitable methods when carrying out research and development activities in the area of media technology
- F4: Is able to critically review relevant literature when solving new or complex problems and is able to integrate the findings into the proposed solution.
- Is able to plan and complete an independent and limited research or development project with guidance and in adherence to research ethics.

Having completed the course, the students should have:

- advanced level of understanding of assumptions and models on which risk analysis methods are based .
- deep understanding of how different assumptions/models influence outcomes of different risk analysis methods.

**Emnets temaer:**

- Classifications of Risk Management methods
- Examples of Risk Management Methods.
- Decision theory
- Risk, Threat and vulnerability discovery
- Uncertainty
- Game theory

**Pedagogiske metoder:**

Forelesninger

Oppgaveløsning

**Vurderingsformer:**

Annet

**Vurderingsformer:**

- Written exam 3 hours (alternatively oral exam): 51%
- Projects: 49%.
- Both parts must be passed.

To ensure fairness, course deliverable grading will depend on deliverable quantity, quality and the number of contributing students.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by external and internal examiners.

**Utsatt eksamen (tidl. kontinuasjon):**

For the written exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Approved calculator

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Einar Snekkenes

**Læremidler:**

Books, articles and WEB resources such as

**RA method classification**

Douglas J. Landoll. The security risk assessment handbook, p. 8-15. CRC. 2005.

Bornman, G, and Labuschagne, L, 2004, A comparative framework for evaluating information security risk management methods, In proceedings of the Information Security South Africa Conference. 2004, [www.infosecsa.co.za](http://www.infosecsa.co.za)

Vorster, A. and Labuschagne, L. 2005. A framework for comparing different information security risk analysis methodologies. In Proceedings of the 2005 Annual Research Conference of the South African institute of Computer Scientists and information Technologists on IT Research in Developing Countries (White River, South Africa, September 20 - 22, 2005). ACM International Conference Proceeding Series, vol. 150. South African Institute for Computer Scientists and Information Technologists, 95-103.

ENISA. Inventory of risk assessment and risk management methods. Deliverable 1, Final version Version 1.0, 0/03/2006

Campbell and Stamp. A classification scheme for Risk Assessment Methods. Sandia Report. SAND2004-4233.

### **RA method examples**

IDART (<http://www.idart.sandia.gov/method.html>)

NIST SP 800-42, p3.1 - 3.21, 4.1- 4.3, C.1-C.9

NIST SP 800-30. p8-27

OECD, "OECD Guidelines for the Security of Information Systems and Networks -- Towards a Culture of Security." Paris: OECD. July 2002. [www.oecd.org](http://www.oecd.org). P 10-12

ISO/IEC 27005:2008(E) Information technology - Security techniqueues - Information security risk management

### **Decision theory**

Sven Ove Hansson. Decision Theory - A brief introduction. 2005

[http://en.wikipedia.org/wiki/Newcomb%27s\\_paradox](http://en.wikipedia.org/wiki/Newcomb%27s_paradox)

[http://en.wikipedia.org/wiki/St\\_Petersburg\\_Paradox](http://en.wikipedia.org/wiki/St_Petersburg_Paradox)

Sven Ove Hansson. Fallacies of Risk

### **Risk Threat and Vulnerability discovery**

ISO 27005, Annex C,D

Ed Yourdon. Just enough Structured Analysis. Chapter 9, Dataflow diagrams. + 'How to'.

The vulnerability assessment and mitigation methodology. Chapter 1-4, p. 1-36. MITRE technical report..

### **Uncertainty**

Lindley, Dennis V. (2006-09-11). Understanding Uncertainty. Wiley-Interscience. ISBN 978-0470043837

H. Campbell. Risk assessment: subjective or objective? Engineering science and education journal, 7:57 -63, 1998.

F. Redmill. Risk analysis-a subjective process? Engineering Management Journal. Apr 2002. Volume: 12, Issue: 2. p. 91-96

### **Game theory**

Stanford Encyclopedia of Philosophy . Game theory. Available from <http://plato.stanford.edu/entries/game-theory/>

Fudenberg, Drew & Tirole, Jean (1991), Game theory, MIT Press, ISBN 978-0-262-06141-4 , Chapters 1,3,6,8

### **Erstatter:**

IMT4771

### **Supplerende opplysninger:**

There is room for 50 students for the course.

### **Klar for publisering:**

Ja

## IMT4881 Fordypningsemne - 2011-2012

**Emnekode:**

IMT4881

**Emnenavn:**

Fordypningsemne

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

Vår

**Varighet (fritekst):**

Can run any time during the full year.

**Språk:**

Engelsk

**Forutsetter bestått:**

Must be determined by the supervisor based upon the particular assignment.

**Forventet læringsutbytte:**

The student will learn how to master a particular topic individually

**Emnets temaer:**

The student and the supervisor will agree on a topic together. The supervisor is responsible for the fact that the workload for the student should be equivalent to other 5ECTS courses. The student will work as much as possible independently with some supervision by the supervisor.

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

The teaching methods depend on the particular topic agreed upon by the student and the supervisor

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Could be both

**Utsatt eksamen (tidl. kontinuasjon):**

The whole subject must be repeated.

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førsteamanuensis Patrick Bours

**Læremidler:**

Depending on the particular agreed upon topic

**Supplerende opplysninger:**

This course is intended for students who want to work independently on a particular topic of his/her interest. The student needs to find a supervisor by him/herself. The supervisor and the student will need to agree on a topic together. Topics can be for example (list is not exclusive):

- \* studying a particular topic from literature
- \* investigating a particular open research problem
- \* performing experiments on a research topic

In general the student will write a report on his studies or findings that can be evaluated either by the supervisor or by an external examiner. Another option for the evaluation could be writing an article for a publication or a presentation at a conference or an oral exam with the supervisor or a third person.

Students are not allowed to take both IMT4881 Specialization course 5 ECTS and IMT4882 Specialization course II 10 ECTS (either IMT4881 or IMT4882).

**Klar for publisering:**

Ja



## **IMT4741 Intrusion detection and prevention - 2011-2012**

**Emnekode:**

IMT4741

**Emnenavn:**

Intrusion detection and prevention

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

First half of the autumn semester

**Språk:**

Engelsk

**Forventet læringsutbytte:****Knowledge**

The candidate possesses advanced knowledge in detection and prevention of intrusions in modern computer systems and networks.

The candidate possesses thorough knowledge about theory and scientific methods relevant for intrusion detection.

The candidate is capable of applying his/her knowledge in new fields of intrusion detection and prevention.

**Skills**

The candidate is capable of analyzing existing theories, methods and interpretations in the field of intrusion detection and working independently on solving theoretical and practical problems.

The candidate can use relevant scientific methods in independent research and development in intrusion detection.

The candidate is capable of performing critical analysis of various literature sources and applying them in structuring and formulating scientific reasoning in the field of intrusion detection and prevention.

The candidate is capable of carrying out an independent limited research or development project in intrusion detection under supervision, following the applicable ethical rules.

**General competence**

The candidate is capable of analyzing relevant professional and research ethical problems in the field of intrusion detection.

The candidate is capable of applying his/her knowledge and skills in new fields, in order to accomplish advanced tasks and projects.

The candidate can work independently and is familiar with terminology in the field of intrusion detection and prevention.

The candidate is capable of discussing professional problems, analyses and conclusions in the field of intrusion detection and prevention, both with specialists and with general audience.

The candidate is capable of contributing to innovation and innovation processes.

**Emnets temaer:**

1. Definition and classification of IDS systems
2. Basic elements of attacks against computer networks and their detection
3. Misuse-based IDS
4. Anomaly-based IDS
5. Testing IDS and measuring their performances

**Pedagogiske metoder:**

Forelesninger  
Lab.øvelser  
Oppgaveløsning  
Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Lectures

Laboratory exercises

Numerical exercises

Project work

**Vurderingsformer:**

Skriftlig eksamen, 3 timer  
Vurdering av prosjekt(er)

**Vurderingsformer:**

Written exam, 3 hours (counts 70% of the final mark)

Project evaluation (counts 30% of the final mark)

Both parts must be passed.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Calculator, dictionary

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Slobodan Petrovic

**Læremidler:****Obligatory literature:**

None.

**Recommended literature:**

1. Rebecca Gurley Bace, Intrusion Detection, Macmillan, 2000.
2. Jack Koziol, Intrusion Detection with SNORT, SAMS, 2003.
3. David J. Marchette, Computer Intrusion Detection and Network Monitoring - A Statistical Viewpoint, Springer Verlag, 2001.
4. Richard Bejtlich, Extrusion Detection - Security Monitoring for Internal Intrusions, Addison-Wesley, 2005.
5. Stephen Northcutt, Judy Novak, Network Intrusion Detection, 3rd edition, New Riders, 2003.

**Erstatter:**

IMT5151 - Intrusion detection and prevention

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4741>

## **IMT4751 Wireless communication security - 2011-2012**

**Emnekode:**

IMT4751

**Emnenavn:**

Wireless communication security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Second half of the autumn semester

**Språk:**

Engelsk

**Forutsetter bestått:**

The student is required to have some knowledge of cryptography equivalent to IMT4532 (Cryptology 1)

**Forventet læringsutbytte:****Knowledge**

The candidate possesses advanced knowledge in the field of wireless communication security, which includes the following topics: security in RFID, wireless LAN, Bluetooth, 2G and 3G mobile telephony.

The candidate possesses thorough knowledge about theory and scientific methods relevant for wireless communication security.

The candidate is capable of applying his/her knowledge in new fields of wireless communication security.

**Skills**

The candidate is capable of analyzing existing theories, methods and interpretations in the field of wireless communication security and working independently on solving theoretical and practical problems.

The candidate can use relevant scientific methods in independent research and development in wireless communication security.

The candidate is capable of performing critical analysis of various literature sources and applying them in structuring and formulating scientific reasoning in the field of wireless communication security.

The candidate is capable of carrying out an independent limited research or development project in wireless communication security under supervision, following the applicable ethical rules.

**General competence**

The candidate is capable of analyzing relevant professional and research ethical problems in the field of wireless communication security.

The candidate is capable of applying his/her knowledge and skills in new fields, in order to accomplish advanced tasks and projects.

The candidate can work independently and is familiar with terminology in the field of wireless communication security.

The candidate is capable of discussing professional problems, analyses and conclusions in the field of wireless communication security, both with specialists and with general audience.

The candidate is capable of contributing to innovation and innovation processes.

**Emnets temaer:**

1. Basic radio-frequency communications
2. RFID, Wireless LAN, Bluetooth security
3. Security of 2G mobile telephony systems
4. Security of 3G mobile telephony systems

**Pedagogiske metoder:**

Forelesninger  
Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Lectures

Project work

**Vurderingsformer:**

Skriftlig eksamen, 3 timer  
Vurdering av prosjekt(er)

**Vurderingsformer:**

Written exam, 3 hours (counts 70% of the final mark)

Project evaluation (counts 30% of the final mark)

Both parts must be passed.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Calculator, dictionary

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Slobodan Petrovic

**Læremidler:****Books:**

1. Gunter Schafer, Security in Fixed and Wireless Networks: An Introduction to Securing Data Communications, John Wiley & Son Inc. 2003
2. V. Niemi, K. Nyberg, UMTS Security, John Wiley & Sons, 2005

**Erstatter:**

IMT5171 - Wireless communication security

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4751>



## IMT4762 Risk Management I - 2011-2012

**Emnekode:**

IMT4762

**Emnenavn:**

Risk Management I

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

First part of the semester

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Se engelsk versjon

**Emnets temaer:**

Se engelsk versjon

**Pedagogiske metoder:**

Forelesninger

Gruppearbeid

Nettstøttet læring

Prosjektarbeid

Samling(er)/seminar(er)

Veiledning

**Pedagogiske metoder (fritekst):**

Se engelsk versjon

**Vurderingsformer:**

Muntlig, individuelt

Vurdering av prosjekt(er)

**Vurderingsformer:**

Se engelsk versjon

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by external and internal examiner.

**Utsatt eksamen (tidl. kontinuasjon):**

Not allowed.

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Høgskolelektor Tone Hoddø Bakås

**Læremidler:**

The course literature will be the documents listed below or similar.

All literature listed below are available from ISACA ([www.isaca.org](http://www.isaca.org)).

ISACA. The Risk IT Framework. 2009. ISBN 978-1-60420-111-6

ISACA. THE RISK IT PRACTITIONER GUIDE. 2009. ISBN 978-1-60420-116-1

Additional recommended reading

IT Governance Institute. COBIT 4.1. 2007.. ISBN 1-933284-72-2

**Klar for publisering:**

Ja

## IMT3511 Discrete Mathematics - 2011-2012

**Emnekode:**

IMT3511

**Emnenavn:**

Discrete Mathematics

**Faglig nivå:**

Bachelor (syklus 1)

**Studiepoeng:**

10

**Varighet:**

Vår og høst

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Etter fullført emne skal studentene

1. Kunne forstå de grunnleggende elementene av abstrakt algebra
2. Kunne forstå de grunnleggende elementene av kombinatorikk, deriblant grafteori

**Emnets temaer:**

- Generelle begreper
  - Logikk
  - Bevis
  - Mengder
  - Algoritmer
  - Kombinatorikk
  - Diskret sannsynlighet
- Grafteori
  - Konnektivitet
  - Korteste vei
  - Farging
  - Spennetrær (minimale)
- Tilstandsmaskiner
  - Endelige tilstandsmaskiner
  - Turing maskiner
- Abstrakt algebra
  - Grupper
  - Ringer
  - Kropper
- Kodeteori
  - Hammingavstand
  - Feilopprettende koder
  - BCH koder

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning  
Veiledning

**Vurderingsformer:**

Muntlig, individuelt

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ingen kontinuasjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Godkjent kalkulator

**Obligatoriske arbeidskrav:**

Ingen

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Førsteamanuensis Patrick Bours

**Læremidler:**

- Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th edition, McGraw-Hill International Edition (2007)
- William J. Gilbert and W. Keith Nicholson: Modern Algebra with Applications, 2nd edition, Wiley (2004)

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4621 Biometrics - 2011-2012

**Emnekode:**

IMT4621

**Emnenavn:**

Biometrics

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Varighet (fritekst):**

First half of spring semester

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

The course content will be complementary to the course IMT4721 "Authentication".

**Forventet læringsutbytte:****Knowledge:**

The candidate possesses advanced knowledge in Biometrics.

The candidate possesses thorough knowledge about theory and scientific methods relevant for design, development and operation of biometric access control systems.

The candidate is capable of applying his/her knowledge in new fields of IT-security systems.

**Skills**

The candidate is capable of analyzing existing theories, methods and interpretations in the field of biometrics and working independently on solving theoretical and practical problems.

The candidate can use relevant scientific methods in independent research and development in biometrics.

The candidate is capable of performing critical analysis of various literature sources and applying them in structuring and formulating scientific reasoning in biometrics.

The candidate is capable of carrying out an independent limited research or development project in biometrics under supervision, following the applicable ethical rules.

**General competence**

The candidate is capable of analyzing relevant professional and research ethical problems in biometrics.

The candidate is capable of applying his/her biometric knowledge and skills in new fields, in order to accomplish advanced tasks and projects.

The candidate can work independently and is familiar with biometric terminology.

The candidate is capable of discussing professional problems, analyses and conclusions in the field of biometrics, both with specialists and with general audience.

The candidate is capable of contributing to innovation and innovation processes.

### **Objectives:**

After the course, the students should have acquired:

1. Knowledge about common statistical tools for biometrics
2. Insight into advantages and disadvantages of biometric characteristics
3. Understanding of multimodal biometrics
4. Knowledge of ethical and privacy issues in biometrics.
5. Understanding of the threats and protection mechanisms for biometric data

**Emnets temaer:**

- Fingerprint recognition
- Vein recognition
- Face recognition specifically focused on three dimensional data
- Iris recognition
- Multimodal biometrics
- Attack mechanisms
- Privacy Enhancing Technologies

**Content**

In this course, several key aspects of biometrics are covered. The course begins with an overview of applied statistics and hypothesis tests as well as other common statistical tools for biometrics, and then covers selected biometric concepts, particularly fingerprint recognition, vein recognition, face recognition and iris recognition. To this end, the relevant physiological characteristics, their variability, and potential problems are discussed before analyzing different approaches for each of the attributes to be investigated. In each case, not only benign applications are covered but also potential bottlenecks such as insufficient sample quality along the entire processing chain. The use of multi-biometrics including data fusion is discussed both in the context of robustness against attacks and improving the overall accuracy of the recognition process. The course continues with a discussion of the ethical and privacy-related issues in biometrics, along with possible limitations and technical mitigation mechanisms. Special attention is given to privacy enhancing technologies that provides protection of sensitive biometric data. In this line the course concludes with comparison-on-card approaches and template protection concepts that allow revocation of biometric references.

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

Tutorial: Afternoon sessions with seminar discussion and practical tasks

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Vurderingsformer:**

Written examination in English

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by an external examiner.

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Dictionaries allowed (no calculator)

**Obligatoriske arbeidskrav:**

Students can contribute a research report (term paper) on a topic that is chosen by the student in coordination with the lecturer, which will be considered for the assessment

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Christoph Busch

**Læremidler:****Recommended literature:**

[1] LI, S. Z., AND JAIN, A. K., Eds. Handbook of Face Recognition. Springer-Verlag,

Heidelberg, Germany, 2005.

[2] MALTONI, D., MAIO, D., JAIN, A. K., AND PRABHAKAR, S. Handbook of Fingerprint Recognition. Springer-Verlag, Heidelberg, Germany, 2005.

[3] WAYMAN, J., JAIN, A., MALTONI, D., AND MAIO, D., Biometric Systems.

Springer-Verlag, Heidelberg, Germany, 2005.

[4] JAIN, L.C., HALICI, U., HAYASHI, I.; LEE, S.B., TSUTSUI, S. Intelligent Biometric Techniques in Fingerprint and Face Recognition. CRC PressVerlag, 1999.

[5] TUYLS, P., SKORIC, B., KEVENAAR, T. Security with Noisy Data. Springer-Verlag, 2007

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja



## IMT4612 Machine Learning and Pattern Recognition I - 2011-2012

**Emnekode:**

IMT4612

**Emnenavn:**

Machine Learning and Pattern Recognition I

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

Expected prior-knowledge: Understanding of basic statistics like probability density function, variance, etc. Basic analysis and matrix algebra. Digital image Processing with Matlab (a student should be able to do some basic manipulations of images)

**Forventet læringsutbytte:**

This course develops understanding of use of statistical analysis for multidimensional data. It also give fundamentals to understand data analysis from raw measurement values to higher level decision making in color and image context. The course develops basic understanding for difference between analysis with or without a priori data as well as ways to evaluate results. The methods will be learned in practical sessions, where they will be programmed and tested with real data. The course is practice oriented, where students learn basics of data analysis useful in color, color image and spectral image analysis and processing. In lectures basics of methods are lectures and in practical session, their usage is practices. The aim is not to get deep theoretical understanding and derivation of methods.

On completion of this course the students will be able to:

- Understand principles how multidimensional statistical methods differ from one dimensional methods.
- Program some basic clustering and classification methods and test their validity.
- Program some basic Neural networks methods and test their validity.
- Extract features from raw, measured values of data to be analysed.
- Understand the distribution of information in statistical analysis and meaning in data representation.
- To apply basic statistical and data analysis methods to color and image data.

**Emnets temaer:**

Basics of multidimensional statistical analysis.

- Principal component analysis.
- Data classification: Bayesian classifier, k-NN classifier, basics of neural networks.
- Data clustering: k-means clustering, Self-Organizing map.
- Classification and clustering validity testing: leave-one-out, ground truth.

Practical Laboratory Sessions:

- Write spectral color and image data reading and writing routines by Matlab
- Produce PCA component images and reconstruct spectral images from PCA eigenimages
- Realize some classification methods by Matlab
- Realize some clustering methods by Matlab
- Make simple tests of spectral image segmentation, spectral image categorization etc. using learned methods

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

Nettstøttet læring

Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

Øvinger

**Vurderingsformer:**

- Exam (70%)
- Exercises (30%)
- Each part must be individually approved of

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

One internal and one external examiner

**Utsatt eksamen (tidl. kontinuasjon):**

For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke

**Læremidler:**

Literature and study materials: Handouts of the material covered in the lectures will be distributed.

- R.O.Duda, P.E. Hart, and D.G. Storck: Pattern Classification. 2nd ed., Wiley, 2001.
- Sergios Theodoridis, Konstantinos Koutroumbas. "Pattern Recognition", third edition. Academic Press.

**Erstatter:**

IMT4611

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4641 Computational Forensics - 2011-2012

**Emnekode:**

IMT4641

**Emnenavn:**

Computational Forensics

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Se engelsk versjon

**Emnets temaer:**

Se engelsk versjon

**Pedagogiske metoder:**

Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Se engelsk versjon

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Se engelsk versjon

**Utsatt eksamen (tidl. kontinuasjon):**

Se engelsk versjon

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke

**Læremidler:**

Se engelsk versjon

**Supplerende opplysninger:**

Se engelsk versjon

**Klar for publisering:**

Ja

## IMT4541 Foundations of Information Security - 2010-2011

**Emnekode:**

IMT4541

**Emnenavn:**

Foundations of Information Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Første halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Having completed the course, the student should have

- understood the key modelling techniques used for secure computer systems and reasoning about them
- good understanding of models and mechanisms for identification and authentication and access control
- obtained a solid understanding of security analysis and developmental assurance techniques and issues

**Emnets temaer:**

- Identification and authentication mechanisms including biometrics
- Access control models and formalisms
- Decidability results and limitations of access control and security models
- Security models including the Bell-LaPadula, RBAC, and Chinese Wall models
- Information-theoretic models of information flow and covert channels
- Developmental assurance and evaluation criteria

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

- Lectures
- Term paper

**Vurderingsformer:**

Annet

**Vurderingsformer:**

- Written exam, 3 hours, (alternatively oral exam): 67%
- Term paper: 33%
- Pass decision is on the cumulative grade.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by external and internal examiners.

**Utsatt eksamen (tidl. kontinuasjon):**

A new term paper must be provided next autumn. For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Dictionary, simple calculator

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Stephen Wolthusen

**Læremidler:**

The following textbooks are the primary references; further recommended reading is provided in the course syllabus.

- M. Bishop: Computer Security: Art and Science. Addison-Wesley, 2003.
- D. Gollmann: Computer Security, 2nd edition Wiley, 2006

**Erstatter:**

IMT4162 Information Security and Security Architecture

**Supplerende opplysninger:**

Capacity of the course is limited to 50 students unless explicitly arranged by lecturer.

**Klar for publisering:**

Ja

## IMT4552 Cryptology 2 - 2010-2011

**Emnekode:**

IMT4552

**Emnenavn:**

Cryptology 2

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forutsetter bestått:**

IMT4531 Cryptology 1

**Forventet læringsutbytte:**

In the course the students will acquire:

- Advanced level of understanding of methods of analysis and synthesis of cryptographic systems
- Deep understanding of modern cryptographic theory

**Emnets temaer:**

1. Stream ciphers
2. Block ciphers
3. Public key ciphers with applications.

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer



**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Calculator, dictionary

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Slobodan Petrovic

**Læremidler:**

Books:

1. Introduction to Cryptography and Coding Theory, 2. edition, Trappe W., Washington L., Prentice Hall, 2006, ISBN: 0131981994.

2. Handbook of Applied Cryptography, Menezes A., <http://www.cacr.math.uwaterloo.ca/hac>

**Erstatter:**

IMT4551 Selected Topics in Cryptology

**Supplerende opplysninger:**

There is room for 50 students for the course.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4552>

## IMT4541 Foundations of Information Security - 2011-2012

**Emnekode:**

IMT4541

**Emnenavn:**

Foundations of Information Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Første halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Having completed the course, the student should have

- understood the key modelling techniques used for secure computer systems and reasoning about them
- good understanding of models and mechanisms for identification and authentication and access control
- obtained a solid understanding of security analysis and developmental assurance techniques and issues

**Emnets temaer:**

- Identification and authentication mechanisms including biometrics
- Access control models and formalisms
- Decidability results and limitations of access control and security models
- Security models including the Bell-LaPadula, RBAC, and Chinese Wall models
- Information-theoretic models of information flow and covert channels
- Developmental assurance and evaluation criteria

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

- Lectures
- Term paper

**Vurderingsformer:**

Annet

**Vurderingsformer:**

- Written exam, 3 hours, (alternatively oral exam): 67%
- Term paper: 33%
- Pass decision is on the cumulative grade.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by external and internal examiners.

**Utsatt eksamen (tidl. kontinuasjon):**

A new term paper must be provided next autumn. For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Dictionary, simple calculator

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Stephen Wolthusen

**Læremidler:**

The following textbooks are the primary references; further recommended reading is provided in the course syllabus.

- M. Bishop: Computer Security: Art and Science. Addison-Wesley, 2003.
- D. Gollmann: Computer Security, 2nd edition Wiley, 2006

**Erstatter:**

IMT4162 Information Security and Security Architecture

**Supplerende opplysninger:**

Capacity of the course is limited to 50 students unless explicitly arranged by lecturer.

**Klar for publisering:**

Ja

## IMT4561 Applied Information Security - 2011-2012

**Emnekode:**

IMT4561

**Emnenavn:**

Applied Information Security

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Students who have passed this course should:

- have acquired good knowledge of the common terminology in information security
- have working knowledge of security analysis methods
- have a good understanding of selected attack mechanisms and techniques and their employment by malicious software
- have working knowledge of database security
- have good understanding of design principles for secure information systems

**Emnets temaer:**

- Core terminology for information security
- Authentication and authentication techniques
- Security analysis methods
- Design principles for secure information systems
- Case studies of secure system design
- Database security
- Attack mechanisms and techniques
- Malicious software

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning  
Prosjektarbeid  
Annet

**Pedagogiske metoder (fritekst):**

Annet - Tutorials

**Vurderingsformer:**

Annet

**Vurderingsformer:**

Written examination, 3 hours, (2/3) in conjunction with term paper (1/3). Pass decision is on the cumulative grade.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer.

**Utsatt eksamen (tidl. kontinuasjon):**

A new term paper must be provided next autumn. For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Simple calculator

**Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Stephen Wolthusen

**Læremidler:**

Books:

- M. Bishop: Computer Security: Art and Science. Addison-Wesley, Reading, MA, USA (2002)
- D. Gollmann: Computer Security, 2nd ed. John Wiley & Sons, New York, NY, USA (2006)
- M. Gasser: Building a Secure Computer System. Van Nostrand Reinhold, New York, NY, USA (1988)
- R. Anderson: Security Engineering: A Guide to Building Dependable Distributed Systems. John Wiley & Sons, Chichester, UK (2001)
- A. K. Jain, P. J. Flynn, and A. A. Ross: Handbook of Biometrics. Springer-Verlag, Berlin, Germany (2007).

**Erstatter:**

IMT4162 Information Security and Security Architecture

**Klar for publisering:**

Ja

## IMT4904 Master Thesis - 2012-2013

**Emnekode:**

IMT4904

**Emnenavn:**

Master Thesis

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

30

**Varighet:**

Høst

Vår

**Varighet (fritekst):**

Se engelsk beskrivelse.

**Gjelder fra vårsemesteret 2013.****Språk:**

Norsk, alternativt engelsk

**Forutsetter bestått:**

Se engelsk beskrivelse.

**Forventet læringsutbytte:**

Se engelsk beskrivelse.

**Emnets temaer:**

Se engelsk beskrivelse.

**Pedagogiske metoder:**

Prosjektarbeid

Samling(er)/seminar(er)

Veiledning

**Vurderingsformer:**

Muntlig fremføring

Muntlig, individuelt

Vurdering av prosjekt(er)

**Vurderingsformer:**

Se engelsk beskrivelse.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Se engelsk beskrivelse.

**Utsatt eksamen (tidl. kontinuasjon):**

Se engelsk beskrivelse.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

Se engelsk beskrivelse.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Prodekan/Vicedean Ivar Farup

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4901>

## **IMT4532 Cryptology 1 - 2011-2012**

**Emnekode:**

IMT4532

**Emnenavn:**

Cryptology 1

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

First half of the autumn semester

**Språk:**

Engelsk



**Forventet læringsutbytte:****Knowledge**

- The candidate possesses advanced knowledge in classical cryptography, as well as fundamentals of stream ciphers, block ciphers and public key ciphers.
- The candidate possesses thorough knowledge about theory and scientific methods relevant for cryptology.
- The candidate is capable of applying his/her knowledge in new fields of cryptology.

**Skills**

- The candidate is capable of analyzing existing theories, methods and interpretations in the field of cryptology and working independently on solving theoretical and practical problems.
- The candidate can use relevant scientific methods in independent research and development in cryptology.
- The candidate is capable of performing critical analysis of various literature sources and applying them in structuring and formulating scientific reasoning in cryptology.
- The candidate is capable of carrying out an independent limited research or development project in cryptology under supervision, following the applicable ethical rules.

**General competence**

- The candidate is capable of analyzing relevant professional and research ethical problems in cryptology.
- The candidate is capable of applying his/her cryptographic knowledge and skills in new fields, in order to accomplish advanced tasks and projects.
- The candidate can work independently and is familiar with cryptographic terminology.
- The candidate is capable of discussing professional problems, analyses and conclusions in the field of cryptology, both with specialists and with general audience.
- The candidate is capable of contributing to innovation and innovation processes.

**Emnets temaer:**

1. Classical cryptography - history of cryptography, fundamentals of information theory and its application in cryptography
2. Symmetric ciphers - stream and block ciphers
3. Asymmetric ciphers - fundamentals, RSA
4. Hash functions and digital signatures.

**Pedagogiske metoder:**

Forelesninger  
Oppgaveløsning

**Pedagogiske metoder (fritekst):**

Lectures

Numerical exercises

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Vurderingsformer:**

Written exam, 3 hours

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Calculator, dictionary

**Obligatoriske arbeidskrav:**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Slobodan Petrovic

**Læremidler:****Books:**

1. Introduction to Cryptography and Coding Theory, 2. edition, Trappe W., Washington L., Prentice Hall, 2006, ISBN: 0131981994.

2. Handbook of Applied Cryptography, Menezes A., <http://www.cacr.math.uwaterloo.ca/hac>

**Erstatter:**

IMT4531 Introduction to Cryptology

**Supplerende opplysninger:**

There is room for 50 students for the course.

**Klar for publisering:**

Ja

**Emneside (URL):**

<http://www.hig.no/imt/emnesider/imt4532>

## IMT4581 Nettverkssikkerhet - 2011-2012

**Emnekode:**

IMT4581

**Emnenavn:**

Nettverkssikkerhet

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Vår

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

Noe kjennskap til kryptologi

**Forventet læringsutbytte:**

Se engelsk versjon

**Emnets temaer:**

Se engelsk versjon

**Pedagogiske metoder:**

Essay

Forelesninger

**Vurderingsformer:**

Annet

**Vurderingsformer:**

Totalvurdering bestående av 100 poeng hvorav 50 poeng kan oppnåes på essay og 50 poeng på 3-timers skriftlig eksamen. Omregning fra 100-poengskala til A-F-skala skjer i henhold til anbefalt omregningstabell, men emneansvarlig kan i spesielle tilfeller gjøre små justeringer av grenser for å sikre overenstemmelse med de kvalitative beskrivelsene på A-F-skalaen.

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ordinær kontinuasjon på skriftlig eksamen

**Tillatte hjelpemidler:**

**Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

Ingen

**Obligatoriske arbeidskrav:**

Ingen

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Adjunct Professor Jan Audestad

**Læremidler:**

Kompendium forfattet av emneansvarlig, tilgjengelig via Fronter.

**Erstatter:**

IMT4101 Sikkerhet i distribuerte systemer

**Supplerende opplysninger:**

Emnet har plass til max. 50 studenter

**Klar for publisering:**

Ja

## IMT4012 Digital Forensics I - 2010-2011

**Emnekode:**

IMT4012

**Emnenavn:**

Digital Forensics I

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Språk:**

Engelsk

**Forutsetter bestått:**

se engelsk versjon

**Anbefalt forkunnskap:**

se engelsk versjon

**Forventet læringsutbytte:**

se engelsk versjon

**Emnets temaer:**

se engelsk versjon

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

**Vurderingsformer:**

Annet

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

se engelsk versjon

**Utsatt eksamen (tidl. kontinuasjon):**

se engelsk versjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

se engelsk versjon

**Obligatoriske arbeidskrav:**

se engelsk versjon

**Ansvarlig avdeling:**

Avdeling for teknologi, økonomi og ledelse

**Emneansvarlig:**

Adjunct Associate Professor André Årnes (andre.arnes@hig.no)

**Læremidler:**

se engelsk versjon

**Supplerende opplysninger:**

se engelsk versjon

**Klar for publisering:**

Ja

## IMT4022 Digital Forensics II - 2010-2011

**Emnekode:**

IMT4022

**Emnenavn:**

Digital Forensics II

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Vår

**Språk:**

Engelsk

**Forutsetter bestått:**

se engelsk versjon

**Anbefalt forkunnskap:**

se engelsk versjon

**Forventet læringsutbytte:**

se engelsk versjon

**Emnets temaer:**

se engelsk versjon

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

**Vurderingsformer:**

Annet

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

se engelsk versjon

**Utsatt eksamen (tidl. kontinuasjon):**

se engelsk versjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

se engelsk versjon

**Obligatoriske arbeidskrav:**

se engelsk versjon

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke (katrin.franke@hig.no) /Adjunct Associate Professor André Årnes  
(andre.arnes@hig.no)

**Læremidler:**

se engelsk versjon

**Supplerende opplysninger:**

se engelsk versjon

**Klar for publisering:**

Ja



## IMT4641 Computational Forensics - 2010-2011

**Emnekode:**

IMT4641

**Emnenavn:**

Computational Forensics

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

- Understand, recognize and review cutting-edge problems in the application of computational methods to forensics
- Collect, analyze and discuss previously published research results in the field
- Identify, plan, prepare and conduct independent research in computational forensics

**Emnets temaer:**

- Forensic Imaging,
- Signal and Video Processing,
- Computer Visualization,
- Forensic Statistics and Intelligence,
- Information Retrieval,
- Data Mining,
- Pattern Recognition and Machine Learning.

**Possible Applications:**

- Digital and Media Forensics,
- Psychological and Behavioral Analysis,
- Questioned Document Examination,
- Forensic Linguistic, Speaker Identification,
- Tool Mark, Trace or Blood-strain Pattern Investigation,
- Crime Scene Investigation.

**Pedagogiske metoder:**

Prosjektarbeid

**Pedagogiske metoder (fritekst):**

Annet - Face-to-Face Meetings, Assignments.

**Vurderingsformer:**

Vurdering av prosjekt(er)

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer(s)

**Utsatt eksamen (tidl. kontinuasjon):**

The whole subject must be repeated.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke

**Læremidler:**

Scientific articles related to the field of specialization.

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4612 Machine Learning and Pattern Recognition I - 2010-2011

**Emnekode:**

IMT4612

**Emnenavn:**

Machine Learning and Pattern Recognition I

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Språk:**

Engelsk

**Anbefalt forkunnskap:**

Expected prior-knowledge: Understanding of basic statistics like probability density function, variance, etc. Basic analysis and matrix algebra. Digital image Processing with Matlab (a student should be able to do some basic manipulations of images)

**Forventet læringsutbytte:**

This course develops understanding of use of statistical analysis for multidimensional data. It also give fundamentals to understand data analysis from raw measurement values to higher level decision making in color and image context. The course develops basic understanding for difference between analysis with or without a priori data as well as ways to evaluate results. The methods will be learned in practical sessions, where they will be programmed and tested with real data. The course is practice oriented, where students learn basics of data analysis useful in color, color image and spectral image analysis and processing. In lectures basics of methods are lectures and in practical session, their usage is practices. The aim is not to get deep theoretical understanding and derivation of methods.

On completion of this course the students will be able to:

- Understand principles how multidimensional statistical methods differ from one dimensional methods.
- Program some basic clustering and classification methods and test their validity.
- Program some basic Neural networks methods and test their validity.
- Extract features from raw, measured values of data to be analysed.
- Understand the distribution of information in statistical analysis and meaning in data representation.
- To apply basic statistical and data analysis methods to color and image data.

**Emnets temaer:**

Basics of multidimensional statistical analysis.

- Principal component analysis.
- Data classification: Bayesian classifier, k-NN classifier, basics of neural networks.
- Data clustering: k-means clustering, Self-Organizing map.
- Classification and clustering validity testing: leave-one-out, ground truth.

Practical Laboratory Sessions:

- Write spectral color and image data reading and writing routines by Matlab
- Produce PCA component images and reconstruct spectral images from PCA eigenimages
- Realize some classification methods by Matlab
- Realize some clustering methods by Matlab
- Make simple tests of spectral image segmentation, spectral image categorization etc. using learned methods

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

Nettstøttet læring

Oppgaveløsning

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

Øvinger

**Vurderingsformer:**

- Exam (70%)
- Exercises (30%)
- Each part must be individually approved of

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

One internal and one external examiner

**Utsatt eksamen (tidl. kontinuasjon):**

For the exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

None

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke

**Læremidler:**

Literature and study materials: Handouts of the material covered in the lectures will be distributed.

- R.O.Duda, P.E. Hart, and D.G. Storck: Pattern Classification. 2nd ed., Wiley, 2001.
- Sergios Theodoridis, Konstantinos Koutroumbas. "Pattern Recognition", third edition. Academic Press.

**Erstatter:**

IMT4611

**Supplerende opplysninger:**

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 and if yes, in which form.

**Klar for publisering:**

Ja

## IMT4571 IT Governance - 2011-2012

**Emnekode:**

IMT4571

**Emnenavn:**

IT Governance

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Høst

**Varighet (fritekst):**

Andre halvdel av semesteret

**Språk:**

Engelsk

**Forventet læringsutbytte:**

Calder and Watkins define IT Governance as "the framework for the leadership, organizational structures and business processes, standards and compliance to these standards, which ensures that the organization's information systems support and enable the achievement of its strategies and objectives". IT Governance is of crucial importance for organizations owing to the need to best safeguard critical information and, through the increasing requirements from national and international regulations. Central to IT Governance in Europe is the ISO 27001 / ISO 27002 standard.

This course provides an overview of IT Governance and the basic concepts of the ISO 27001 / ISO 27002 standard.

The candidate should after attending the course

- fully understand the main principles of IT Governance.
- fully understand the basic concepts of the ISO 27001 / ISO 27002 standard
- master the principles for designing & implementing an ISO 27001 ISMS
- be fully aware of the difference between security technology and the management of secure systems
- have a thorough understanding of security management as a continuous improvement process.
- possess awareness of security certification schemes (BS7799, ISO 15408, ...)

**Emnets temaer:**

- Reasons for IT Governance: Compliance, liability, stability
- Organizing information security
- Information security policy and scope
- The risk assessment and statement of applicability
- Identification of risks related to external parties
- Asset management
- Human resources security
- Physical and environmental security
- Equipment security
- Communications and operations management
- Controls against malicious software (malware) and back-ups
- Network security management and media handling
- Exchanges of information
- Electronic commerce services
- E-mail and internet use
- Access control
- Network access control
- Operating system access control
- Application access control and teleworking
- Systems acquisition, development and maintenance
- Cryptographic controls
- Security in development and support processes
- Monitoring and information security incident management
- Business continuity management
- Compliance
- Principles of auditing

**Pedagogiske metoder:**

Annet

**Pedagogiske metoder (fritekst):**

Lectures, exercises and projects.

**Vurderingsformer:**

Annet

**Vurderingsformer:**

- 1-2 Multiple Choice Tests (weight: 20%)
- 1-2 group Assignments (weight: 30%)
- Digital Final exam, 2 hours (weight: 50%)
- All three parts are mandatory and must be passed!

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Evaluated by the lecturer

**Utsatt eksamen (tidl. kontinuasjon):**

For the final exam: Ordinary re-sit examination.

**Tillatte hjelpemidler:****Obligatoriske arbeidskrav:**

None.

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Forskningssjef Åsmund Skomedal

**Læremidler:**

Literature:

Alan Calder & Steve Watkins. IT Governance : IT Governance: A Manager's Guide to Data Security and ISO 27001 / ISO 27002. Fourth Edition. Kogan Page. 2008.

Anderson, Ross (1999) Why cryptosystems fail, University Computer Laboratory, University of Cambridge, Cambridge, UK, <http://www.cl.cam.ac.uk/~rja14/wcf.html>.

**Klar for publisering:**

Ja



## IMT4022 Digital Forensics II - 2011-2012

**Emnekode:**

IMT4022

**Emnenavn:**

Digital Forensics II

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

10

**Varighet:**

Vår

**Språk:**

Engelsk

**Forutsetter bestått:**

se engelsk versjon

**Anbefalt forkunnskap:**

se engelsk versjon

**Forventet læringsutbytte:**

se engelsk versjon

**Emnets temaer:**

se engelsk versjon

**Pedagogiske metoder:**

Forelesninger

Lab.øvelser

**Vurderingsformer:**

Annet

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

se engelsk versjon

**Utsatt eksamen (tidl. kontinuasjon):**

se engelsk versjon

**Tillatte hjelpemidler:****Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

se engelsk versjon

**Obligatoriske arbeidskrav:**

se engelsk versjon

**Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Professor Katrin Franke (katrin.franke@hig.no) /Adjunct Associate Professor André Årnes  
(andre.arnes@hig.no)

**Læremidler:**

se engelsk versjon

**Supplerende opplysninger:**

se engelsk versjon

**Klar for publisering:**

Ja

## **IMT4591 Rettslige aspekter ved informasjonssikkerhet - 2011-2012**

**Emnekode:**

IMT4591

**Emnenavn:**

Rettslige aspekter ved informasjonssikkerhet

**Faglig nivå:**

Master (syklus 2)

**Studiepoeng:**

5

**Varighet:**

Vår

**Språk:**

Norsk, alternativt engelsk

**Forventet læringsutbytte:*****Knowledge***

- The candidate possesses advanced knowledge in legal aspects especially relevant for information security. This applies particularly to the legal regulation of matters of importance to safeguarding confidentiality, integrity, access and quality.

***Skills***

- The candidate is capable of performing critical analysis of various literature sources regarding legal aspects of information security.
- The candidate is capable of carrying out an independent limited research or development project in legal aspects of information security under supervision, following the applicable ethical rules.

***General competence***

- The candidate is capable of analyzing relevant professional and research ethical problems in legal aspects of information security.
- The candidate is capable of applying his/her knowledge about legal aspects of information security in new fields, in order to accomplish advanced tasks and projects.
- The candidate can work independently and is familiar with legal terminology.

**Emnets temaer:**

Generelle bestemmelser om informasjonssikkerhet, særlig innenfor e-forvaltning

Sikring av personopplysninger ved innsamling, bearbeiding og lagring av opplysninger

Regler for elektronisk kommunikasjon

**Pedagogiske metoder:**

Forelesninger  
Gruppearbeid  
Oppgaveløsning  
Samling(er)/seminar(er)

**Vurderingsformer:**

Skriftlig eksamen, 3 timer

**Karakterskala:**

Bokstavkarakterer, A (best) - F (ikke bestått)

**Sensorordning:**

Intern + ekstern sensor

**Utsatt eksamen (tidl. kontinuasjon):**

Ingen ordinær kontinuasjon

**Tillatte hjelpemidler:****Ansvarlig avdeling:**

Avdeling for informatikk og medieteknikk

**Emneansvarlig:**

Timelærer Lise Nilsen

**Læremidler:**

Se oversikt i emnets rom i Fronter.

**Klar for publisering:**

Ja