

# Fall 2021

## IDATA2501 Information security

### Suggested Prerequisite Knowledge

Learning outcomes from the first two years of computer science study (BIDATA).

### Course content

The foundation for information security

- Terminology
- Integrity, confidentiality and availability

Technological considerations regarding information security

- Storage and use of digital information
- Firewalls, backdoors, viruses, security breaches in applications
- Security requirements to the systems
- Risk management
- Single point of failure, backup, physical safety measure
- Problems addressing wireless
- Cryptography and certificates

Organizational problems regarding information security:

- Identify the human factor
- Managements responsibilities for information security
- Risk management and information assets management
- Increase knowledge regarding information security
- The conflict between security and user friendly systems

Importance of anchoring security work in the entire organization: standards, laws and regulations.

### Learning materials

Books:

1. Principles of Information Security (6th ed) Course Technology-Cengage Learning, 2018, ISBN-13 9781337102063. Michael E. Whitman and Herbert J. Mattord.

2. Håndbok i datasikkerhet - informasjonsteknologi og risikostyring (4. utgave) Tapir Akademisk Forlag, 2019, ISBN 978-82-4502789-1. Torgeir Daler, Roar Gulbrandsen, Tore Audun Høie og Torbjørn Sjølstad.

### Learning activities

Teaching methods: Lectures, case studies and assignments

Mandatory work requirements: All mandatory case studies/assignments and the term paper are to be delivered in time to get an assessment.

Mandatory activities: 3-5 mandatory assignments. All the mandatory assignments have to be approved in order to get access to the exam, and they are part of the portfolio.

### Learning outcomes

Knowledge:

- understand the meaning of information security
- know and understand the key concepts within the area
- have a good understanding of the value of information and information systems in sustainable organizations (B)
- know current threats to information security
- have a good knowledge of the laws and regulations of the area
- be familiar with recognized methods and standards for improved information security
- have knowledge of relevant technical and organizational means to improve information security

Skills:

- do a risk analysis for an hypothetical organization (case) (I)
- recommend appropriate and effective measures to improve information security
- prepare a contingency plan for a hypothetical business (case)
- establish adequate security in restricted operating environment (lab)

Competence:

- be able to update their knowledge about information security
- communicate their knowledge of information security also to persons without ICT background
- be able to communicate on the subject with an organization's strategic management

### Examination

Portfolio assessment. The portfolio consist of a predefined number of case studies/assignments and a term paper/project. The assessment is an overall evaluation of the portfolio. Candidates may be called to an additional oral examination.



# IDATA2502 Cloud Service Administration

## Suggested Prerequisite Knowledge

- IDATA2304 Computer networks and network programming
- IDATA2305 Operating systems and system programming
- IDATA1002 Software engineering

or equivalent knowledge.

## Course content

1. Information system role in the business
2. Servers and services
3. Virtual servers, cloud servers and containers
4. Cloud services
5. Agile development and DevOps
6. Definition tools
7. Automated integration and testing
8. Continuous delivery

## Learning materials

Announced at the start of the semester.

## Learning activities

Pedagogical methods: theory lectures, case studies, lab exercises.

Mandatory work: 3-5 mandatory assignments.

The course can be taught in English.

## Learning outcomes

Knowledge:

- Information system role in modern sustainable organizations (B)
- Usual cloud service properties
- Popular methods for cloud service administration
- Connection between development, testing and production

Skills:

- Establish, maintain and use code for definition of infrastructure for a limited information service
- Be able to assess and choose the best cloud service considering organizational needs, economy and competence (I)
- Be able to communicate with peers about the course topics in written and oral form both in Norwegian and English

General competence:

- Have understanding of information system strategic meaning for a business
- Be able to communicate with strategic leadership in a company

### Examination

Portfolio assessment. Portfolio will consist of a given number of case studies / assignments and a project. Grading is based on evaluation of the portfolio as a whole. All mandatory case/exercise assignments and project must be delivered to get access to examination.

## IDATA2503 Mobile applications

### Suggested Prerequisite Knowledge

The following subjects or their equivalents:

- IDATA2306 Application development (server programming)
- IDATA2303 Data modelling and database applications
- IDATA2001 Programming 2 (Object-oriented programming)

### Course content

- Introduction to mobile platforms
- Programming language Kotlin
- Android platform
- Cross-platform development
- Cloud computing and corresponding security mechanisms

### Learning materials

Shared at the start of the semester.

### Learning activities

Theory lectures. Mandatory exercises. Development of a software project.

### Learning outcomes

Knowledge:

- Mobile platforms, with focus on Android
- Cross-platform development technologies for mobile phones
- Programming language Kotlin
- "Cloud computing" and corresponding security mechanisms

Skills:

- Develop an application for a mobile platform
- Program in language Kotlin
- Use Cloud computing platform and corresponding security mechanisms

General competence:

- Can specify, plan and implement projects with commercialization potential based on mobile and distributed technologies (I)
- Can discuss and reflect around subject topics and share knowledge with others

## Examination

Oral exam based on the project and course topics.

To get access to the examination, all mandatory lab exercises and lab report must be delivered within given deadlines and must be approved.

## IDATA2504 Game development

### Suggested Prerequisite Knowledge

Programming (IDATA1001 and IDATA2001, or equivalent), preferably object oriented.

### Course content

The students will learn a variety of topics related to game design and programming, including:

- Game engines, with focus on Unity3D
- Game design
- Game programming, design patterns
- Intelligent agents for games
- Animation
- Graphics
- Human-computer-interaction for games
- Physics in games
- Game mechanics
- Application of games in other domains (serious games for teaching, gamification)

This is a practical course and includes significant part of practical game development and teamwork.

### Learning materials

Announced at the start of the semester.

### Learning activities

Lectures, exercises and project work.

### Learning outcomes

Knowledge:

- Understanding of game development process: from design to implementation and testing
- Knowledge of important game development concepts listed in the course topics

Skills. Candidate can:

- Reuse available game assets made by third parties (B)
- Design a game with a commercialization potential (I)
- Use Unity3D game engine to implement a game (D)
- Evaluate an existing game and reflect on its quality based on theoretical principles.

General competence:



- Ability to discuss course topics with other peers
- Ability to present his/her own game to others and justify choices from technological, usability and ethical aspects (E)

## Examination

Portfolio assessment.

All mandatory assignments must be delivered on time and approved to get access to examination.

# Spring 2022

## IDATA2301 Web technologies

### Suggested Prerequisite Knowledge

IDATA1001 Programming 1, IDATA2001 Programming 2, IDATA1002 System development or equivalent.

### Course content

Subject is concerned with Frontend development - website programming.

### Content:

- Basics of websites: HTML, HTTP protocol, CSS
- Javascript for dynamic websites
- Frameworks for website development
- Privacy, GDPR, Universal design

### Learning materials

Jennifer Robbins, Learning Web Design, 5th Edition, A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, Publisher: O'Reilly Media, ISBN-13: 978-1491960202

### Learning activities

Individual studies, theory lectures, lab exercises, project work individually and in groups

### Learning outcomes

#### Knowledge:

- HTML, CSS and Javascript for web system development
- secure web system development techniques
- Web servers
- Application servers
- Content Management Systems
- History of the web

Skills. Candidate ca:

- code HTML, CSS and Javascript using integrated development environment for effective web development (D)
- use version control of source code for effective development individually and in a team (D)
- develop systems based on real problems, within given restrictions with a commercialization potential (I)
- use, administer and install a CMS system or web framework (D)

General competence:

- know web technology history to be able to extend old solutions and systems (B)
- know and recognize different roles in web projects for effective cooperation in a team
- know history of web technology applications for informed and ethical choices of technologies. Be able to discuss problems and share with other domain experts. (E)

Examination

Portfolio assessment and oral examination.

## IDATA2306 Application development

### IDATA2301 Web technologies

#### Suggested Prerequisite Knowledge

IDATA2001 Programming 2 IDATA2305 Operating systems IDATA2303 Algorithms and data structures  
IDATA2303 Data modelling and database applications or equivalent knowledge

#### Course content

Course will establish definitions, principles, frameworks and architectures of application development. Course emphasizes transactions, persistence, Object-relational mapping (ORM) web services and messaging services. Important examples will be based on frameworks such as Spring Book, as well as container environments such as Docker and Kubernetes.

#### Learning materials

Announced at the start of the semester.

#### Learning activities

Lectures and exercises, project work in groups.

#### Learning outcomes

##### Knowledge:

- Student will have knowledge about services provided by application server, use of these services in a distributed application and service maintenance in container-based runtime environment.
- Student will be able to work with IDEs, build systems, application servers and containers

##### Skills:

- Student will be able to program application services and use containers efficiently, as both system developer and administrator.
- Student will be able to develop a distributed application from scratch, as well as maintain it in a modern runtime environment.

##### General competence:

- Student will understand challenges and solutions for distributed application development.
- Student will understand challenges and solutions for maintenance of distributed applications in a modern runtime environment.

### Examination

Oral exam where course project is discussed.

Exam registration requires that class registration is approved in the same semester. Compulsory activities from previous semester may be approved by the department.