FRI academy

Faculty of Computer and Information Science
University of Ljubljana

We provide the IT knowledge for the needs and wants of every business.

University *of Ljubljana*
Faculty *of Computer and Information Science*

The FRI academy offers IT-oriented courses for professional staff and the general public. Important knowledge is presented by educators, researchers and external staff of the Faculty of Computer and Information Science at the University of Ljubljana, Slovenia.

Within the framework of the FRI academy, courses are covering everything from artificial intelligence, machine learning and data science, the Internet of Things and cloud services to modern infrastructures and containers, information systems, smart contracts with blockchain technology, biometrics and other specialized topics. Focus of courses is on professional development for individuals and growth for businesses.

You can choose courses out of this catalog. Each one can be adapted to the wishes and needs of the participants. Therefore, we can adjust the duration, content and depth of education - for example, basic knowledge for students and career beginners or advanced for employees who want to upgrade their knowledge and would like to make the next step in their career.

The FRI academy also offers **unique fully tailored** courses for businesses which may include prototyping. Lecturers will consult with you to find out precisely what you need and what would be most beneficial for you to achieve from the course.

All of the courses are held in English and can be conducted at the headquarters of your company or organization. Courses are organized for groups of at least 5 people.

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PRICES

Prices may vary depending on complexity of the course!

A lecture:
• 3-4 academic hours: **4.000,00 €**
• 5-6 academic hours: **6.000,00 €**

A specialized course with a demo project (max 15 people):
• 3-4 academic hours: **6.000,00 €**
• 5-6 academic hours: **7.000,00 €**

"Hands on" intensive course (max 10 people):
• 3-4 academic hours: **8.000,00 €**
• 5 academic hours **9.000,00 €**
• 6 academic hours: **10.000,00 €**

* VAT is not included in the price.

Each participant receives:
• notes with additional explanation, illustrations and examples;
• free software and data that will be used during the course;
• FRI academy Certificate.

We offer the possibility of conducting courses at the headquarters of your company or organization. In this case, the payment of travel expenses will be charged extra, as well as the payment of accommodation.

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Introduction to Data Mining

Introduction to data mining is the first step into the world of data science. The course is intended for complete beginners, who wish to learn about the core methods of machine learning with the help of visualizations and interactive presentation of algorithms. We will learn about the procedures without programming and math. Also without boring Power Points. This is a practical course with real-life use cases. After the course you will be able to independently design and use analytical workflows and try them on new data.

Content

- Data exploration and visualization.
- Hierarchical clustering.
- Cluster exploration and outlier detection.
- K-means.
- Projections, MDS.
- Customer segmentation.

For whom?

For everyone excited about data analysis and who wish to take it a step further from simple statistics.

After the course you will ...

... know two methods for discovering groups in the data.
... be able to independently cluster data and explain the found groups.
... be able to detect outliers in the data and test the quality of clustering.

Prerequisities

None.

Duration

5 academic hours

Lecturers

- Ajda Pretnar, researcher

Introduction to Text Mining

The course introduces the main techniques of data mining and text analysis. The participants will learn about the key methods for text mining and preparation of text data for the analysis. The course is practical and will introduce the concepts and methods of data science through the analysis of real-life data. At the end, the participants will be able to test their knowledge on a practical example.

Content

- Data loading and interactive visualizations.
- Text preprocessing and vectorization.
- Text clustering and document segmentation.
- Sentiment analysis.
- Practical examples.

For whom?

For everyone excited about data analysis and who wish to take it a step further from simple statistics.

After the course you will ...

... be able process text and prepare it for downstream analysis.
... know two key methods for text clustering.
... be able to segment documents and explain the found groups.
... be able to perform sentiment analysis on text.

Prerequisities

None.

Duration

5 academic hours

Lecturers

- Prof. dr. Blaž Zupan
- Ajda Pretnar, researcher

Data Science for Business

Advanced course where we will dive into the core algorithms of machine learning and learn how they work. By leveraging intuition and simple use cases we will show the strengths and weaknesses of each approach. Every lesson ends with a practical task where the participants test their newly acquired knowledge on new data. We will learn about the newest approaches in data science and machine learning, which are specifically intended for business segment. We focus on intuition. No heavy math, statistics or programming. The course is practical. We will work on use cases and studies – no boring Power Points.

Content

- Data exploration and preprocessing.
- Basics of statistical analysis through intelligent visualization.
- Clustering and customer segmentation.
- Projections of multidimensional data.
- Decision trees, random forest, logistic regression.
- Predictive modelling and predicting churn.
- Overfitting and common mistakes in predictive modelling.
- How to build a model correctly.
- Model evaluation and scoring methods.
- Predicting on new data.

For whom?

For everyone excited about data analysis and who wish to take it a step further from simple statistics.

After the course you will ...

... be able to predict customer churn.
... understand decisions of certain classifiers.
... be able to make business decisions based on models.
... know how to segment customers into groups.
... be able to independently design an analytical workflow.

Prerequisities

None.

Duration

10 academic hours

Lecturers

- Prof. dr. Blaž Zupan
- Ajda Pretnar, researcher

Managing Big Data

The amount of data we capture every day is increasing exponentially. Apart from social media that contribute a lot to this phenomenon, the Internet of Things is another trend making disruption in this regard. The fact that almost every object is nowadays able to communicate over the Internet, brings along many changes and challenges that we have to face with. One of them is data management. If relational databases were until recently the only way of storing and manipulating data, this is no longer the case today. In this course you will learn what are the key constraints of traditional data management systems and how to address these challenges with modern, data-intensive systems.

Content

- Bigdata and challenges in managing large amounts data.
- Data-intensive systems.
- Comparison of data models (relational, document, graph), their pros and cons.
- Comparison of relational and noSQL database management systems.
- Examples of noSQL databases.
- Basics of Hadoop ecosystem (Spark, Nifi, Kafka, HBase, Solr, ...).

For whom?

This course is for developers that are involved in information systems development, data management and retrieval and for IT managers taking decisions in designing information system architectures.

After the course you will ...

... be able to handle problems related to big data and to design scalable information systems.
... be able to handle unlimited amounts of data and users. Y
... learn how to choose between database management systems depending on the characteristics of a specific problem.
... learn basics of the development of data-intensive information systems.

Prerequisities

To follow this course, it is expected that you are familiar with the basics of data management systems and information systems development. Students that will pass this course are suggested to take the course on the Hadoop ecosystem, where they will learn through hands-on experience, how to capture, ingest, store, process and visualize large amounts of data. Within this course they will work with a number of popular tools including Apache Druid, Lucene/Solr, Neo4j, Kafka, Nifi, HiveMQ, Spark, Superset in Grafana.

Duration

4 academic hours

Lecturers

- Prof. dr. Marko Bajec
- Assist. Prof. dr. Slavko Žitnik

Hadoop Ecosystem to ingest, store, process and visualize large amounts of Data

Hadoop is an open-source platform based on a distributed file system HDFS that serves as the core to many popular tools in data ingest, storage, processing, and visualization. Within these hands-on courses, students will learn about specific tools through use cases and examples. This topic is covered with three independent courses:

- data storage,
- data ingest and processing, and
- data visualization.

Course 1: data storage

The purpose of this course is to gain basic knowledge of how data is stored in the distributed system Hadoop. In particular, these three tools will be represented:

- HBase, as a basic distributed storage of the Hadoop data system,
- Lucene/Solr, as a storage for semi-structured textual data and
- Neo4J, as a graph-oriented data management system.

Course 2: data ingest

The purpose of this course is to gain basic knowledge of how bigdata is ingested to the distributed system Hadoop. In particular, these three tools will be represented:

- Kafka, as a distributed streaming platform that is used to build real time streaming data pipelines and applications that adapt to data streams,
- Nifi, as a tool that supports powerful and scalable directed graphs of data routing, transformation, and system mediation logic, and
- HiveMQ, as a MQTT broker and a client based messaging platform designed for the fast, efficient and reliable movement of data to and from connected IoT devices.

Course 3: data processing and visualization

The purpose of this course is to gain basic knowledge of bigdata processing and visualization within the distributed system Hadoop. In particular, these three tools will be represented:

- Spark, as one of the most known and popular tools for distributed processing (including real time processing),
- Superset, as an example of tool for business intelligence that supports efficient data exploring and visualization, and
- Graphana, as an example of tools for quick development of dashboards for monitoring and alarming.

For whom?

These courses are in particular useful for IT professionals that work with bigdata, including data ingest, storage, processing and visualization, and for developers that often deal with the development of data-intensive systems.

After the course you will ...

... gain basic knowledge on how to manipulate data within the distributed platform Hadoop using specific tools for data ingest, storage, processing and visualization.

Prerequisities

While not strictly required, it is recommended that you have basic knowledge on the distributed, highly-available platforms for data manipulatio

Duration

2 x 4 academic hours (for each course)

Lecturers

- Prof. dr. Marko Bajec
- Assist. Prof. dr. Slavko Žitnik
- Assist. Prof. dr. Dejan Lavbič

Applied Bayesian Statistics with the Stan Probabilistic Programming Language

The main purpose of this workshop is to familiarize ourselves with Bayesian statistics and probabilistic programming. Probabilistic programming brings statistics closer to programmers and enables them to analyze data correctly and quickly in most practical scenarios. Probabilistic thinking is also key to understanding modern statistical and machine learning approaches.

Content

- Fundamentals of probabilistic thinking and Bayesian statistics.
- Probabilistic progamming and Stan.
- Examples: estimating a parameter, group comparisons, linear regression.
- Practical and computational aspects of Bayesian statistics.

For whom?

The workshop aims at participants that are skilled in programming and would like to expand their skill set to data analysis. It is also appropriate for researchers and other experts that already use statistical methods and would like to learn more about the Bayesian view on statistical analysis.

After the course you will ...

... be familiar with the basics of probabilistic thinking and programming, which will enable you to do statistical modelling in most practical scenarios.

Prerequisities

- Good programming skills, basics of probability and an interest in analyzing data.
- Knowledge of R will help but is not required.

Duration

4 academic hours

Lecturers

- Assoc. Prof. dr. Erik Štrumbelj
- Assist. Prof. dr. Jure Demšar

Recommender Systems

It is almost impossible to imagine what the modern web would be without recommender systems, as they considerably reduce information overload and allow the user to view/use/purchase products/services that he might like, would almost certainly not be able to find. For the purpose of efficient recommendation, various data management, artificial intelligence and machine learning techniques are used.

Content

- Motivating examples and idea of recommendation.
- Collaborative recommendation (collaborative filtering) and content-based recommendation.
- Knowledge-based recommendation and hybrid recommendation.
- Evaluation of recommender systems and examples of large recommender systems.
- Practical work:
  - Acquiring examples from the web and storing them in a database.
  - Individual implementation of a simple recommender system (user- or item-based collaborative filtering) using nearest neighbors or matrix factorization.
  - Implementing a recommender system using open-source libraries.
  - Implementing a recommender system inside the database.

For whom?

The course is particularly suited for executives and employees who determine company strategy, decision makers, data analysts and data engineers, and marketing employees. For anyone who is dealing with data.

After the course you will ...

... know how to apply the most important recommendation paradigms
... know how to decide which one to use in a specific business problem.

Prerequisities

- Proficiency in Python programming language.
- Basic knowledge of concepts and tools for working with data in Python (Pandas, Numpy, SciPy).
- Basic knowledge of relational databases and SQL.
- Basic knowledge of Python-database connectivity.

Duration

- Shorter course: 9 academic hours of lectures, 6 academic hours of practical work (3 days).
- Longer course: 15 academic hours of lectures, 10 academic hours of practical work (5 days).

Lecturers

- Prof. dr. Marko Robnik-Šikonja
- Assoc. Prof. dr. Matjaž Kukar
- Assist. Prof. dr. Slavko Žitnik

Introduction to Artificial Intelligence and Machine Learning

The course will clarify the difference between human and machine intelligence and will explain the basics of machine learning as a fundamental element of artificial intelligence.

Content

- Introduction and the field overview:
  - What is (artificial) intelligence and what is (machine) learning?
  - The difference between humans and machines,
  - knowledge discovery from databases,
  - supervised learning: classification,
  - overview of applications.
- Basic methods of machine learning:
  - basic principles of machine learning,
  - decision trees,
  - K nearest neighbors,
  - naïve Bayesian classifier,
  - ensemble learning: random forests,
  - introduction to artificial neural networks.
- Practical exercises:
  - introduction to statistical package R, which enables data analysis with different machine learning methods,
  - data preparation,
  - classification.

For whom?

The course is intended for those who would like to know how computers can learn and if the computers are intelligent and what is the difference between humans and machines. For those, who are interested in what nowadays can be achieved with machine learning and artificial intelligence, who wold like to know how to extract useful knowledge from data and would like to make the first step in using data for predictions/decisions.

After the course you will ...

... know the basic principles and abilities of machine learning.

... know how artificial intelligence can be used to solve difficult problems.

Prerequisities

None.

Duration

4 academic hours of lectures and (after the lunch break) 4 academic hours of practical exercises on computers (your own notebooks)

Lecturers

- Prof. dr. Igor Kononenko
- Assist. Prof. dr. Petar Vračar

Deep Learning and Computer Vision

In the recent years we observe a Renaissance in computer vision, that is, with the help of deep learning achieving great results in a form of multiple applications and robotic systems and is entering various areas of our lives. With the development of deep learning methods success and robustness of computer vision approaches drastically improved. This enables the use of this technology not only in controlled environments, but also in other unconstrained scenarios. Application areas extended in industrial applications, as well as in the other domains of everyday life.

The purpose of this training is to present deep learning and computer vision as an enabling technology for development of new products and tackling many challenges on different areas. Briefly we will acquaint participants with basic concepts and interworkings of deep learning in computer vision, with the emphasis on presenting concrete usage examples and transferring practical experiences in development of such solutions.

Content

- Introduction to computer vision and deep learning:
  - What is computer vision, deep learning, artificial intelligence: acquaintance with the main concepts and the basics of operation.
  - Overview of basic functionalities of computer vision: detection, recognition, classification, segmentation etc.
- Usecases and overview of actual implementations:
  - Usecases on actual fields, such as: visual quality control in industry and the control of industrial processes, logistics, marketing, mobile applications, traffic and autonomous driving, medicine and diagnostics, sport, farming, etc.
  - Overview of actual implementations: surface fault detection on industrial (semi)products, detection of dents on car bodies, object detection and counting, traffic sign detection, product quality classification, visual tracking, anonymization of faces and license plates, obstacle detection, image segmentation, biometrics, age estimation based on X-ray images, etc.
- Demonstration on some problems:
  - Live demonstration of some solutions.
  - Discussion about the capabilities and limitations of computer vision.
- Discussion of potential solutions for computer vision:
  - An interactive discussion of concrete problems and possible solutions.
  - Practical tips for implementing computer vision and deep learning solutions.

For whom?

The course is intended for all who are interested in the potential of deep learning and computer vision and would like to learn about the capabilities of this technology and the problems that solve them. The training is therefore intended for executives, heads of development, projects, production, informatics, marketing, technical directors, heads of digitization, solution planners, or everyone

involved in designing and deciding on the introduction of new technologies in the business of the company.

After the course you will ...

... know what is deep learning (machine learning or artificial intelligence) and what is computer vision.
... know what problems were being solved with deep learning and computer vision.
... know the advantages and limitations and benefits of this technology.
... recognize the capabilities and benefits of computer vision and deep learning.
... recognized the potential use of this technology to the company.
... attempt to evaluate the benefits of such use.

Prerequisities

No special knowledge is required as the lectures will provide all the necessary information.

Duration

• 6 academic hours (By arrangement, we also prepare a more extensive and technically more in-depth education.)

Lecturers

• Prof. dr. Danijel Skočaj
• Assist. Žiga Emeršič

Introduction to Biometrics

This course is based on principles of computer vision that represent a basis for the majority of biometric systems, where the input is an image. As a part of this ourse, the content will be delivered theoretically and practically through usecases and the state-of-the-art implementations, including deep learning.

Content

- Biometric modalities.
- Structure of a typical biometric system.
- Recognition/verification/identification.
- Conditions for correct systems comparison (metrics, datasets, protocols, toolboxes).
- Performance and usability of biometric systems.
- Key modalities and systems pipelines:
  - Fingerprint,
  - Iris,
  - Face.
- Multibiometric systems / multimodality / fusion.
- Key challenges of modalities/systems.

For whom?

For everyone interested in high-tech biometrics research, development and products - technical staff who want to understand the operation and performance of biometric systems, such as their users, integrators or developers.

After the course you will ...

... know the key properties of each biometric modality.
... understand all the steps of each biometric system.
... know to define needed properties to introduce a biometric system into a real-life environment.
... know how to properly measure and compare the performance of biometric systems.
... understand the key terminology of each modality and the use of it in the real-life systems.
... understand advantages and shortcommings of specific modalities.
... know how to fuse modalities to achieve better performance of biometric systems.
... know key algorithms of computer vision in biometrics.

Prerequisities

Basic programming knowledge is desirable.

Duration

6 academic hours

Lecturers

- Assoc. Prof. dr. Peter Peer
- Assist. Žiga Emeršič

Kubernetes

Containers and Kubernetes are the most popular technologies for building cloud native applications/systems. We will teach you how to handle and understand the pros and cons of container technology and the operation and architecture of the Kubernetes container orchestrator cluster.

Content

- Introduction to containers.
- Kubernetes overview.
- Key concepts (Pods, Services).
- Kubernetes architecture:
  - Control Plane (master) Components,
  - Node Components,
  - Optional Services.
- Networking.
- API and Kubernetes object model:
  - Components and resources,
  - Using CLI.
- Core Objects:
  - Namespaces,
  - Pods and multi-container patterns,
  - Labels, Annotations, Selectors,
  - Service types.
- Ingress (path/domain based request routing):
  - Overview of Ingress controllers in production.
- Workloads:
  - Deployment,
  - DaemonSet,
  - StatefulSet (support for stateful applications),
  - Jobs, CronJobs
- Kubernetes Application Deployment Strategies:
  - Achieving zero downtime deployment.
  - Rolling Updates, Blue-Green Deployment, Canary Deployment, A/B testing, Shadowing Security.
  - Authentication, Authorization, RBAC, NetworkPolicy.
- Storage.
- Configuration:
  - ConfigMap,
  - Secret.
- Best practices for building and operating containers in Kubernetes.
- Managing complex apps:
  - Kustomize,
  - Helm,
  - jsonnet,
  - GitOps (with flux, ArgoCD).

• Hands-on lab exercises.

Everything is supported by hands-on demos and lab exercises!

For whom?
The course is especially suitable for technical staff (IT architects, developers, administrators ...)

After the course you will ...
... master advantages and disadvantages of container technology.

Prerequisities
None.

Duration
Topics can be expanded/removed/shortened based on trainee interests and duraton of training (1day, 2 day). Course can be also tailored to the specific customer interests, eg. much more detailed Architecture deep dive, Deployment creation flow deep dive, Deploying HA bare-metal Kubernetes clusters (with K8s native sw. load balancing), Depoloying cloud-native AI/ML workloads, etc.

Lecturers
• Assist. dr. Matjaž Pančur
• Assist. Miha Grohar

Microservices, APIs, cloud-native architecture, containers and DevOps

Technologies for digital transformation

This course will introduce the software development approaches for modern digital services, applications and information systems, including the architectural patterns and concepts that are the basis for the modern digital solutions. Special focus will be on the process of introducing the new architectural concepts into the existing environments and the gradual migration from the classic monolithic software development model to the model based on the microservice architecture and other cloud-native concepts, which are used for building the software solutions in the most successful internet companies.

Content

Part one: technologies for the digital transformation

- Digitalisation, digital transformation, digital products and services.
- Digital platform.
- Architectures for developing applications and information systems.
- Requirements of modern digital solutions and API economy.
- What is cloud-native, what are the key advantages and disadvantages, why is it mandatory for the digital transformation?
- Business aspects of the digitalisation and the cloud-native architecture:
  - Why is the cloud-native architecture mandatory for successful realisation of the digital strategy and digital transformation?
  - Why introduce the cloud-native architecture and how does it impact the business and business models?
  - How does the introduction impact the organisational aspects, project management and team work?
- Overview of the key concepts of the cloud-native architecture:
  - Microservices.
  - APIs and API gateways.
  - Containers.
  - Container orchestration.
  - Cloud-native patterns.
  - Integrations.
  - DevOps.
  - Principles of building cloud-native software solutions.
- Introducing the cloud-native architecture:
  - Do's and dont's.
  - Lessons learned.
  - Migration to the cloud-native architecture.

Part two: technical aspects and live demos

- Elements of the cloud-native architecture:

  - Configuration and service discovery.
  - Identity management, authentication and authorisation.
  - Achieving high availability.
  - Fault-tolerance, health checks, metrics.
  - Communication models, protocols and principles (synchronous, asynchronous, event streaming, gRPC, GraphQL, etc.).
  - Feature flags, canary release, change management.
- Containers and orchestration:
  - Why Docker containers?
  - Basic principles for introducing the containers.
  - Kubernetes and orchestration.
  - Advanced orchestration architectures.
- The role of DevOps:
  - Principles, technology and the added value of DevOps.
  - Continuous Everything.
  - Automation of processes.
  - Versioning and deployment of microservices.
  - Automating the infrastructure and the platform.
- Practical demonstrations of technologies and concepts.

For whom?

The course has two parts. Part one is aimed at management, CIOs, IT managers, digital strategists, board members, focusing on IT and digitalisation, solution and software architects, and developers that are working on projects aimed at developing digital solutions and have to understand the technical concepts and the business aspects.
Part two is more technical and is aimed at IT managers, architects, developers and other IT personnel that are interested in technical aspects of the digitalisation and cloud-native architectures.

After the course you will ...

... understand, what each company has to do in IT to be ready for the digital business.
... be familiar with the technologies and architectures required for successful, fast and agile development of digital solutions.
... understand the cloud-native architecture, microservices, APIs, containers, DevOps and know how they come together.
... be able to successfully introduce the new technologies and development models.
... have practical experience based on the successfully completed projects.

Prerequisities

None.

Duration

8 academic hours

Lecturers

- Prof. dr. Matjaž Branko Jurič

Practical usage of Smart Contracts in Blockchain Technology

The aim of the course is to present Smart contracts, from the available technologies, trends, tools, practices and related approaches, comprehensively. A particular focus will be devoted into practical usability applied on the existing (Cloud based) architectures as a component that enables agreement among different entities. The course can be held in Italian or in English.

Content

- An overview ob the blockchain technology.
- What are Smart contracts and what is their usage?
- Life cycle of Smart contracts.
- Systematic overview the cryptocurrencies that enable Smart contracts.
- Development process of Smart contracts in Ethereum ledger.
- Overview of the Smart contracts off-chain enabled approach by using Smart oracles.
- Tools for development, validation, testing and deployment of Smart contracts in the testing environment.
- Examples of good and bad practices of Smart contracts in Ethereum ecosystem.

For whom?

The course is suitable for developers, system administrators and others that are interested in the digital alternative of the notarised contracts.

After the course you will ...

... master the full use of Smart contracts.

Prerequisities

Basic knowledge of JavaScript language.

Duration

9 academic hours

Lecturers

- Sandi Gec, researcher

Smart Home

In this lecture you will understand how to make your home/company “smart”. By using Raspberry Pi platform and its sensors you will be able to light up smart lightbulbs and report this to your mobile devices.

Content

- Development of communication between the smart lightbulb and RPI.
- Development of communication between RPI and mobile phone.
- Development of basic Android application.
- Development over Windows IoT.
- Overview of theoretical design and functionalities.

For whom?

The lecture is appropriate for developers.

After the course you will ...

... know how to implement complexed rules and devices in your home/company.

Prerequisities

Basic programming skills.

Duration

5 academic hours

Lecturers

- Assist. Žiga Emeršič
- Assist. Blaž Meden

Let the Tigers roam!

Practical application of INFOSEC for Companies with an Emphasis on Tiger teaming

Information Security - Penetration testing in depth. Everything from the initial contracting, to OSINT, threat modelling, report writing and follow-ups. The emphasis is on human attack vectors and passive intelligence gathering. This is a theoretical and practical exercise.

Content

- Ethics and the division between passive and active attacks.
- Usage and practical application of some of the pen testing tools.
- How to write a pen testing report and keep forensic grade logs of your activities.

For whom?

The target audience for this course are individuals who wish to acquire skills to freelance or work as INFOSEC professionals inside a corporation.

After the course you will ...

... get access to specialised tools used for pen-testing for up to six months after the ending of the course.

... not be an Ethical Hacker, but you will have the knowledge which would make official certification a lot easier, if you are so inclined.

Prerequisities

Some technical foundation knowledge preferred. *nix skills recommended but not required. Willingness to learn and quickly absorb technical skills. You will work as a team, therefore a wide range of profiles is welcome. From social and cognitive scientists, to criminologists and computer scientists.

- Threat recognition. Skills to take advantage of vulnerabilities.
- The ability to discern weaknesses in corporate structures.
- Familiarity with psychology of persuasion (useful in penetration testing and in communicating with contractual partners).

Duration

4 academic hours

Lecturers

- Assoc. Prof. dr. David Modic

Identifying and responding to InfoSec Attacks

How to protect your company and how to legally and ethically respond to a breach. Communication with stakeholders (line managers, senior management, those who detected the breach and so on). There will be a segment on responsible disclosure and communication with the HR and PR departments, as well as the legal services and media.

Content

- Quick refresher of the terminology.
- Defending a company (OSINT, pen testing of own infrastructure, breach databases, CERT collaboration, continuous education, sensible updating, security policies, examples of good and bad practice).
- Recognizing an active attack (netflow logs, analytical tools, public services, typical attack vectors).
- How to stop an attack without breaking the law and ending in jail.
- Communication with the senior management (how to disclose, what to say, how to avoid negative consequences for something that is not your fault...).
- Advising legal, PR and HR services on how to handle an incident.
- Communication with the person who detected a breach.
- Responsible disclosure.

For whom?

Technical staff - sys admins, CTO's, CISO's, info sec and compliance officers, CERT members.

After the course you will ...

... better and earlier recognition of an active incident.
... Preventative response to a breach.
... Being clear on your responsibilities and duties as an INFOSEC professional.
... Ability to clearly and effectively communicate with various stakeholders involved in a breach.
... Protecting and handling the staff members who discovered a breach.
... Know about ethics of responsible disclosure.

Prerequisities

Solid technical skills (*nix familiarity preferred, but not strictly necessary). Ability to use forensic and exploit tools (or at least learn how to use them on the go). Bring your own computing device.

Duration

8 academic hours

Lecturers

- Assoc. Prof. dr. David Modic

Recognizing InfoSec Threats and responding to them

In this course, the focus will be on recognizing and responding to security threats. We will look at some basic terms, explore intruder profiling and look at some of the effective breaches of the times past. We will briefly touch upon the legal framework applicable to informational security and discuss optimal and legal responses to incidents.

Content

- Basic terminology (INFOSEC, OSINT, threat modelling, attack vectors ...).
- Common threat models (the progression of an attack, typical aims, attacker profiling, mechanical and human attack vectors).
- Effective past attacks and lessons learned. How to recognize threats.
- Responding to an incident from the different hierarchical perspectives and collaboration with outside problem solvers (e.g. CERT).
- InfoSEC legal framework for dummies.

For whom?

Small, medium and large enterprises employees. Very basic technical knowledge required (i.e. awareness that the Internet exists and the ability to receive and send an email). While the technical staff will benefit from the course, it is not exclusively aimed at them.

After the course you will ...

... know how to identify attacks.
... have better response to threats.
... be able to report incidents in the right way.

Prerequisities

See target audience.

Duration

4 academic hours

Lecturers

- Assoc. Prof. dr. David Modic

WebGL from the Ground Up

Nowadays complex graphics applications can be run in web browsers, thanks to WebGL. Usually, WebGL is used for 3D visualization, but it can also be used for general-purpose parallel computing (e.g. machine learning). While most beginner WebGL courses focus on the basics of 3D graphics, this one is targeted towards those of you that want to learn WebGL in detail from the ground up. Despite being notoriously complex and difficult to pick up, this course aims to break those myths and present WebGL from a completely new perspective.

Content

- Motivation with practical use cases.
- Overview of the WebGL API.
- Data transfer between the CPU and the GPU.
- Shaders.
- Optimization.
- Practical work.

For whom?

This course is aimed towards (but not exclusively) those, that:

- think that JavaScript is often not fast enough,
- want to add special effects to their web pages,
- have to design 2D or 3D visualizations,
- develop video games,
- want to accelerate general-purpose computing tasks (e.g. machine learning), or
- want their applications to work on both desktop and mobile platforms.

After the course you will ...

... understand in depth the design of the WebGL API.
... know how to accelerate general-purpose computing tasks.
... know how to use WebGL for graphics and non-graphics applications.
... be able to develop fast parallel applications that work in all modern web browsers.

Prerequisities

The JavaScript language.

Duration

8 academic hours

Lecturers

- Assist. Žiga Lesar

Design Thinking

Through a hands-on case study a design approach will be presented to solve complex multifaceted problems that put potential users of products and services at the center.

Content

- Through examples you will understand why, where and how the design approach is a suitable methodology.
- You will learn about the key five stages of the method.
- Key techniques, highlights and pitfalls will be presented for each phase.
- After course you will be able to apply the principles of the design approach in practice.
- Education will be highly practical oriented and the acquired knowledge can be put to use immediately for key text mining approaches for word processing, visualization and exploratory data analysis.

For whom?

For managers of large and small businesses and their employees, for start-ups, government and academic staff.

After the course you will ...

... begin to take a different approach to solving complex problems and developing new solutions, both in the business world, as in private life. The acquired knowledge forms the basis for further training.

Prerequisities

None.

Duration

4 academic hours

Lecturers

- dr. Rok Stritar