SHAKE THE FUTURE.

CENTRALE NANTES

MASTER OF SCIENCE, TECHNOLOGY AND HEALTH

CONTROL AND ROBOTICS

SIGNAL AND IMAGE PROCESSING

YEAR 1

PROGRAMME SUPERVISORS:
GUY LEBRET, OLIVIER-HENRI ROUX

Établissement public sous tutelle du ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation

GROUPE CENTRALE

École Centrale de Nantes | 1 rue de la Noë | BP 92101 | F 44321 Nantes Cedex 3
T +33 (0)2 40 37 16 00 | F +33 (0)2 40 37 16 97 | www.ec-nantes.fr

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING

YEAR 1 - AUTUMN SEMESTER

Signal Processing

Systems Identification and Signal Filtering

Embedded Electronics

Embedded Computing

Classical Linear Control

Artificial Intelligence

Cultural and Communication English

French Language

SIGNAL PROCESSING

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Eric LE CARPENTIER

Objectives

- To interpret the spectral representations of signals
- To understand the time sampling of signals (sample rate, anti-aliasing filter etc.)
- To model a system using the transfer functions language
- To model a system using the state space language
- To switch from one representation to the other
- To link the physical phenomena to the parameters of these representations (stability, response velocity etc.)
- To simulate these mathematical representations with adapted scientific software tools (Matlab, Simulink)

Course contents

- Analysis of continuous-time and discrete-time signals
  - Fourier, Laplace and z transforms
  - Sample, hold, quantization, Shannon theorem
- Modelling of continuous-time and discrete-time linear time invariant (LTI) systems
  - Transfer function, state space representation
  - Poles, zeros, stability
  - Time response, frequency response
  - Sampling
  - Simulation (Matlab Simulink)
  - First-order and second-order systems
- Design of an actual digital control implementation
  - Analog to Digital Converter, Digital to Analog converter
  - Sample and hold
  - Link with the previous mathematical representations
- Lab work
  - Music: from the sound signal to the score
  - Tide Periodicities
  - Spacecraft control simulation

Course material

- Modern Signals and Systems, H. Kwakernaak, R. Sivan, Prentice Hall.
- Signals and Systems, R. Baraniuk, http://www.eng.ucy.ac.cy/cpitris/courses/ece623/notes/SignalsAndSystems.pdf
- Signal processing. Introduction to signals and systems theory, E. Le Carpentier, https://hippocampus.ec-nantes.fr/mod/resource/view.php?id=9179

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	5	14 hrs	0 hrs	18 hrs	0 hrs	2 hrs

SYSTEMS IDENTIFICATION AND SIGNAL FILTERING

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Said MOUSSAOUI

Objectives

After completing this course, the students will be able to:

- specify all the desired properties of a linear filter
- design a linear filter fulfilling the specifications and apply it to a real signal
- give an input-output representation of a system based on observed data
- calculate the parameter of a model and validate on measurement data

Course contents

Signal filtering is a basic operation in signal processing which allows, for instance, undesired content to be deleted. The first part of this course deals with methods to design analog and digital filters and their application for the processing of real signals. The second part of the course focuses on experimental modelling of systems based on linear models. It provides a detailed description of the signal identification chain from data acquisition to model validation.

1. Signal filtering
- principles of linear filtering, filter characterization in the frequency domain
- analog filter synthesis
- digital filter synthesis (FIR, IIR)

2. System identification
- system modelling and identification methodology
- non-parametric identification models and methods
- review of linear models for system modelling (ARX, ARMAX, OE)
- parameter estimation methods (least squares, instrumental variable, maximum likelihood)

3. Applications
- audio signals filtering
- use of the system identification toolbox
- electromechanical system identification

Course material

- L. Ljung, System identification, Theory for the user, Prentice Hall, Englewood Cliffs, 1987
- T. Soderstrom and P. Stoica, System identification, Prentice Hall, 1989
- H. Kwakernaak and R. Sivan, Modern signals and systems, Prentice Hall, Englewood Cliffs, 1991

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	12 hrs	10 hrs	10 hrs	0 hrs	2 hrs

EMBEDDED ELECTRONICS

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Joumana LAGHA

Objectives

At the end of the course the students will be able to:

- understand different synchronous or asynchronous architectures of embedded systems
- interface a microcontroller with a simple environment (LED, motor) and write a programme to control it;
- use VHDL to create the logic circuit used to configure a Complex Programmable Logic Device (CPLD).

Course contents

The first part of the course deals with interfacing a microcontroller:

- interfacing an Arduino with an environment composed of LED, buttons and a motor
- write programmes carrying out simple automatisms controlling this environment

The second part of the course introduces the configuration of a CPLD:

- VHDL Language
- use VHDL to create the logic circuit used to configure a Complex Programmable Logic Device
- control an environment with a Xilinx CoolRunner-II CPLD

Course material

- Philip Koopman, Better Embedded Software Systems, Drumnadrochit Education LLC, 2010
- Volnei A. Pedroni, Circuit Design and Simulation with VHDL, PH, 2011

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	10 hrs	2 hrs	20 hrs	0 hrs	2 hrs

EMBEDDED COMPUTING

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Mikael BRIDAY

Objectives

At the end of the course the students will be able to:

- understand the architecture of a microcontroller;
- design a low-level driver to access a peripheral of a microcontroller and deal with microcontroller interrupts;
- design a bare metal application.

Course contents

The first part of the course deals with the software environment for deeply embedded systems:

- cross compiler: bit operations, memory model, common C design rules, low level C and assembly specific attributes
- link script to declare the memory model to the application
- debugging with a JTAG probe (breakpoints, memory watch, etc)

The second part introduces hardware peripherals of a microcontroller to interact with the environment:

- standard GPIO
- timers
- serial communication peripherals
- interrupts

The third part of the module focuses on the design of a bare metal application, including concurrent execution of both software and hardware parts.

Course material

- Philip Koopman, Better Embedded Software Systems, Drumnadrochit Education LLC, 2010
- D. Patterson & J. Hennessy, Computer Organization and Design – ARM Edition, Morgan Kaufmann, 2017

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	12 hrs	4 hrs	16 hrs	0 hrs	2 hrs

CLASSICAL LINEAR CONTROL

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Guy LEBRET

Objectives

Review the fundamentals of classical control for linear systems and provide a control methodology starting from the open loop analysis of the system to be controlled to the synthesis of a closed loop using classical PID type controllers (one degree of freedom controllers), which can be combined with a feedforward part (two degrees of freedom controllers).

Course contents

- Description of SISO linear systems through the transfer function
- Analysis of behaviour (poles/zeros, first/second/more general systems, time domain/frequency domain responses etc)
- Definition the Control objectives (stability/performance, tracking/regulation)
- Nominal/robust stability (Routh, Nyquist criteria, stability margins).
- Nominal/robust performance and the unavoidable trades off between stability and performance.
- Synthesis of PID type controllers, using frequency approach tunings, in a classical closed loop (one degree of freedom controller strategy).
- Possibility of introducing a feedforward contribution which tries to "invert" the first closed loop obtained (two degrees of freedom controllers).

After completing this course, the students will be able to:
- Analyse the dynamic behaviour of a SISO linear system
- Design a PID type controller as an example of a feedback controller
- Design a feedforward controller to increase tracking performance

Course material

Recommended texts: course notes will be provided by the lecturer.
Further reading:
- "Modern Control Systems", R.C. Dorf and R.H. Bishop, Prentice Hall, 2011.
- "Control Systems Engineering", N. S. Nise, John Wiley & Sons, 2011.
- "Control system design", G.C. Goodwin, S.F. Graebe and M.E. Salgado, Prentice Hall, 2001.
- "Multivariable Feedback Control Analysis and Design", D.S. Skogestad and I. Postlethwaite, Wiley, 2005.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	5	22 hrs	6 hrs	4 hrs	0 hrs	2 hrs

ARTIFICIAL INTELLIGENCE

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Didier LIME

Objectives

The goal of this course is to present how a computerized agent can learn from its environment and find strategies to achieve well-defined goals.

Course contents

The first part covers basic path-finding, which is further extended to account for non-determinism, probabilistic outcomes, partial observability, and the presence of other agents. The second part deals with the specific problems of supervised learning and reinforcement learning.

After completing this course, the students will be able to:

- use and implement graph-based strategy search, in particular using Markov decision processes
- use and implement decision tree and artificial neural network learning (including the basics of deep learning)
- use and implement several simple flavors of reinforcement learning.

Assessment: 100% final examination

Course material

S. Russel, P. Norvig. Artificial Intelligence: A Modern Approach (3rd ed). Pearson, 2009.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	16 hrs	4 hrs	12 hrs	0 hrs	2 hrs

CULTURAL AND COMMUNICATION ENGLISH

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING

YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Spencer HAWKRIDGE

Objectives

Introduction to Cultural and Communicational English:

- Understand the general concepts of communication English (different levels of language, etc.)
- Build a communicational project
- Develop strategies for enhanced interaction
- Organize, lead and participate in discussions, interviews and meetings
- Behavioral skills in an inter-cultural environment:
- Strengthen engagement and level of conviction
- Develop a capacity to explain and argue
- Acquire notions of corporate culture and values
- Enhance team work

Course contents

Cultural and Communicational English: exercises to explore in practice the areas of culture and communication
Inter-cultural project (for example, documentary project, publishing project: construct a work of fiction or of educational value and experience the complete publishing process)

Course material

Written and televised press, information and digital tools, general documents business environment and company strategies.
Internet conferences (Ted Talks, etc.), our own educational materials on Hippocampus (Moodle).
Our own eZoomBook template for the Intercultural project.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

FRENCH LANGUAGE

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - AUTUMN SEMESTER

LEAD PROFESSOR: Silvia ERTL

Objectives

The objective is to familiarize the learner with the French language and French culture through an entertaining task-based communicative language teaching, focused on speaking combined with:

- Phonetics
- Self-correcting exercises on our learning platform
- Learning Lab activities
- Project work
- Tutoring

Course objectives include the acquisition and reinforcement of vocabulary, syntax, and pronunciation by both traditional means and through the use of digital resources.
Students will learn general French, develop language skills of oral and written comprehension and expression.

After completing this course (32 hours + personal work), the students will be able to communicate in spoken and written French, in a simple, but clear manner, on familiar topics in the context of study, hobbies etc. Another important goal of this course is to introduce the student to French culture. At the end of the course (2 semesters), complete beginners can achieve an A1 level and some aspects of the A2 of The Common European Framework of Reference for Languages. More advanced students may aim for B1/B2 levels.

Course contents

Full range of practical communication language exercises: reading comprehension, listening comprehension, written expression, oral expression.

Learners will be able to use the foreign language in a simple way for the following purposes:

1. Gving and obtaining factual information:
- personal information (e.g. name, address, place of origin, date of birth, education, occupation)
- non-personal information (e.g. about places and how to get there, time of day, various facilities and services, rules and regulations, opening hours, where and what to eat, etc.)

2. Establishing and maintaining social and professional contacts, particularly:
- meeting people and making acquaintances
- extending invitations and reacting to being invited
- proposing/arranging a course of action
- exchanging information, views, feelings, wishes, concerning matters of common interest, particularly those relating to personal life and circumstances, living conditions and environment, educational/occupational activities and interests, leisure activities and social life

3. Carrying out certain transactions:

- making arrangements (planning, tickets, reservations, etc.) for travel, accommodation, appointments, leisure activities
- making purchases
- ordering food and drink

Course material

Preparation manuals, our own tailor-made documents, written and televised press, internet, general civilization documents, digital tools, our own educational materials on Hippocampus (Moodle).

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
French	**4**	**0 hrs**	**32 hrs**	**0 hrs**	**0 hrs**	**0 hrs**

YEAR 1 - SPRING SEMESTER

Computer Vision

Programming Real Time Systems

Spectral and Time Frequency Analysis

Optimization Techniques

Mobile Robots

Group Project

Cultural and Communication English

French Language

COMPUTER VISION

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Vincent FREMONT

Objectives

- To acquire knowledge and skills in computer vision and image processing to understand and to master methods for artificial perception and scene understanding.
- To learn to implement current visual odometry pipelines used in mobile robots and to understand and how to tune Deep Learning algorithms for semantic segmentation.

Course contents

- Introduction
- Image Formation 1: perspective projection and camera models
- Image Formation 2: camera calibration algorithms
- Filtering and Edge detection
- Feature Point Detection
- Multiple-view Geometry and Robust Estimation
- Optical Flow and Feature Tracking
- Visual SLAM Frameworks
- Deep Learning and Semantic Segmentation

Practical Work: Sessions on low-level image processing, Structure-from-Motion and Semantic Segmentation will be proposed.

Course material

Recommended textbooks:

- Digital Image Processing, by Rafael C. Gonzalez and Richard E. Woods, 2018
- Computer Vision: Algorithms and Applications, by Richard Szeliski, 2009.
- Multiple view Geometry, by R. Hartley and A. Zisserman, 2003.
- An Invitation to 3D Vision, by Y. Ma, S. Soatto, J. Kosecka, S.S. Sastry, 2004.
- Robotics, Vision and Control: Fundamental Algorithms, by Peter Corke, 2011.

Online courses:

- Course by Davide Scaramuzza: http://rpg.ifi.uzh.ch/teaching.html
- Course by James Hays at Brown University: https://www.cc.gatech.edu/~hays/
- Course by Andrea Vedaldi: http://www.robots.ox.ac.uk/~vedaldi/teach.html

Further reading: will be provided by lecturer

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	20 hrs	0 hrs	12 hrs	0 hrs	2 hrs

PROGRAMMING REAL TIME SYSTEMS

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Sébastien FAUCOU

Objectives

At the end of the course the students will be able to:

- Design the software architecture of a real-time system
- Build deterministic programmes with a multitasking RTOS
- Handle time and recurring events in a real-time application
- Understand and solve race conditions in concurrent software

Course contents

- Introduction to real time systems: what is a real time system, classes of timing constraints, basic model and results on real time scheduling
- Trampoline RTOS: what is a RTOS, when is it useful, architecture of Trampoline, build process, task management and scheduling, synchronisation, handling of recurring events, shared resources
- Design of real time applications: case studies and design patterns

Course material

- Alan Burns, Andy Wellings, Analysable Real-Time Systems: Programmed in Ada, CreateSpace Independent Publishing Platform, 2016
- Giorgio C. Buttazzo, Hard Real-Time Computing Systems: Predictable Scheduling Algorithms and Applications, Springer, 2011
- Philip Koopman, Better Embedded Software Systems, Drumnadrochit Education LLC, 2010

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	12 hrs	4 hrs	16 hrs	0 hrs	2 hrs

SPECTRAL AND TIME FREQUENCY ANALYSIS

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING

YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Sébastien BOURGUIGNON

Objectives

Spectral analysis concerns the estimation of the frequency content of a given signal, which is the fundamental tool for detecting and characterizing harmonic components or wideband phenomena in stationary signals. This course first provides an overview of most frequently used spectral analysis tools, from standard methods based on Fourier analysis to high-resolution methods. Next, time-frequency analysis is considered, which extends spectral analysis to non-stationary signals (that is, when the frequency content changes with time).
The different spectral analysis and time-frequency methods are presented, both in their mathematical and informational foundations and in their practical numerical implementation, through application examples taken from real and simulated data analysis problems.

Course contents

- Fourier-Transform-based spectral analysis methods of discrete-time stationary signals. Power and limitations, windowing, periodograms.
- High-resolution methods of discrete-time stationary signals: linear prediction models, subspace methods, regularized methods.
- Generalization to spectral analysis of images or higher-dimensional data.
- Labs/projects: detection of multiple oscillating components in noise; exoplanet detection from time series; Fourier-based image compression.
- Linear time-frequency representations based on the Short-Term Fourier Transform
- Quadratic time-frequency representations: Wigner-Ville distributions, Cohen's class.
- Labs/projects: comparison of different time-frequency representations; application to automatic transcription of a musical score; use of time-frequency representations for automatic classification (speaker recognition).

Course material

- A.V. Oppenheim and R.W. Schafer. Discrete-time signal processing, Prentice Hall, 2010.
- P. Stoica and R. Moses. Spectral Analysis of Signals, TBS, 2005.
- S. Kay. Modern Spectral Estimation, Prentice -Hall, Englewood Cliffs, 1988.
- L. Cohen, Time-Frequency analysis, Prentice-Hall, 1995.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	12 hrs	10 hrs	10 hrs	0 hrs	2 hrs

OPTIMIZATION TECHNIQUES

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Fouad BENNIS

Objectives

The lecture presents different theoretical and computational aspects of a wide range of optimization methods for solving a variety of problems in mechanical engineering. The main objective of this course is to give the students the ability to formalise, select the appropriate method, implement the optimisation problem and then analyse the results in order to take the best decision regarding the objectives, variables and constraints.

Course contents

- Basic concepts of optimization,
- Gradient based methods,
- Evolutionary algorithms,
- Multi objective optimization methods,
- Robust optimization methods,
- Multidisciplinary optimization problems,
- Programming aspects,
- Use of optimization toolbox.

Practical Work: exercises and a project on the design optimisation of a mechanical product, manufacturing process or system.

The students will be able to understand different theoretical and computational aspects of a wide range of optimization methods.

Course material

R. Fletcher, Practical Methods of Optimization, Wiley, 2000.
Mitchell Melanie: An Introduction to Genetic Algorithms, MIT Press 1996

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	16 hrs	0 hrs	16 hrs	0 hrs	2 hrs

MOBILE ROBOTS

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Gaëtan GARCIA

Objectives

The objective of the course is to provide students with the necessary tools to model, localize and control conventional wheeled mobile robots.

Course contents

The following subjects will be addressed:

- Modelling of wheeled Robots: Constraint equations, Classification of robots using degrees of mobility and steerability, Posture kinematic model, Configuration kinematic model, Motorisation of wheels.
- Localization: Relative localization using odometry, Absolute localisation, Localization sensors, Localization using extended Kalman filtering.
- Control: Controllability and stabilization, static and dynamic feedback linearization, non-linear control based on Lyapunov functions.

Practical Work: The students will study various control laws in simulation. They will also implement a Kalman filter-based localization algorithm using data recorded with a real robot.

Course material

- "Theory of robot control", Carlos Canudas de Wit, Bruno Siciliano, Georges Bastin, Springer Science & Business Media, 2012 - 392 pages.
- PDF documents provided by the teachers.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	20 hrs	0 hrs	12 hrs	0 hrs	2 hrs

GROUP PROJECT

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING

YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Guy LEBRET

Objectives

To contribute to solving a scientific, technological or theoretical problem proposed by any of the instructors of the master (professors, assistant professors, researchers etc.) or industrial partners.

Course contents

The students (individually or often a group of two) organize the project. Depending on the subject, a bibliography may be necessary, an original methodology or solution can be proposed or it can involve purely the application of techniques learned throughout the courses.

32 hours are set aside for the project in the timetable, but additional personal work will be required. Project assessment is based on a written report and an oral presentation.

Course material

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	6	0 hrs	0 hrs	0 hrs	32 hrs	0 hrs

CULTURAL AND COMMUNICATION ENGLISH

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING

YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Spencer HAWKRIDGE

Objectives

Interview techniques and communicational English:

- Understand the general concepts of interactive communication
- Build a media project
- Acquire interview techniques
- Understand the process of sourcing and checking facts and figures
- Understand issues related to plagiarism
- Create a bibliography
- Behavioral skills in an inter-cultural environment:
- Strengthen self-confidence and capacity for interaction
- Develop active listening and reformulation skills
- Develop networking skills

Course contents

Cultural and Communicational English: exercises to explore in practice the areas of culture and communication.
Media project (for example: prepare, conduct and promote interviews for a radio programme: L'Heure Centralienne (http://www.euradionantes.eu/emission/l-heure-centralienne), with the contribution of professors, PhD students, industrial partners, industry players at fairs, etc.

Course material

Written and televised press, information and digital tools, general documents business environment and company strategies.
Internet conferences (Ted Talks, etc.), our own educational materials on Hippocampus (Moodle).
Our own eZoomBook template for the Intercultural project.

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
English	4	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

FRENCH LANGUAGE

CONTROL AND ROBOTICS – SIGNAL AND IMAGE PROCESSING
YEAR 1 - SPRING SEMESTER

LEAD PROFESSOR: Silvia ERTL

Objectives

The objective is to familiarize the learner with the French language and French culture through an entertaining task-based communicative language teaching, focused on speaking combined with:

- Phonetics
- Self-correcting exercises on our learning platform
- Learning Lab activities
- Project work
- Tutoring

Course objectives include the acquisition and reinforcement of vocabulary, syntax, and pronunciation by both traditional means and through the use of digital resources.
Students will learn general French, develop language skills of oral and written comprehension and expression.

After completing this course (32 hours + personal work), the students will be able to communicate in spoken and written French, in a simple, but clear manner, on familiar topics in the context of study, hobbies etc. Another important goal of this course is to introduce the student to French culture. At the end of the course (2 semesters), complete beginners can achieve an A1 level and some aspects of the A2 of The Common European Framework of Reference for Languages. More advanced students may aim for B1/B2 levels.

Course contents

Full range of practical communication language exercises: reading comprehension, listening comprehension, written expression, oral expression.

Learners will be able to use the foreign language in a simple way for the following purposes:

1. Giving and obtaining factual information:
- personal information (e.g. name, address, place of origin, date of birth, education, occupation)
- non-personal information (e.g. about plMechanical Engineering - Advanced manufacturing and how to get there, time of day, various facilities and services, rules and regulations, opening hours, where and what to eat, etc.)

2. Establishing and maintaining social and professional contacts, particularly:
- meeting people and making acquaintances
- extending invitations and reacting to being invited
- proposing/arranging a course of action
- exchanging information, views, feelings, wishes, concerning matters of common interest, particularly those relating to personal life and circumstances, living conditions and environment, educational/occupational activities and interests, leisure activities and social life

3. Carrying out certain transactions:

- making arrangements (planning, tickets, reservations, etc.) for travel, accommodation, appointments, leisure activities
- making purchases
- ordering food and drink

Course material

Preparation manuals, our own tailor-made documents, written and televised press, internet, general civilization documents, digital tools, our own educational materials on Hippocampus (Moodle).

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT	EXAM
French	**4**	**0 hrs**	**32 hrs**	**0 hrs**	**0 hrs**	**0 hrs**