

INGÉNIEUR ENSEEIHT INFORMATIQUE ET TÉLÉCOMMUNICATIONS

IN BRIEF

Type of diploma : Diplôme d'ingénieur

Ministry field : Sciences, Ingénierie et Technologies

MORE INFO

ECTS credits : 180

Level : BAC +5

Type of education

* Formation initiale

Kind of education : Diplôme

Presentation

Le cycle ingénieur comporte un total de 6 semestres : 5 semestres de cours, travaux dirigés, travaux pratiques et projets dans les différentes matières ; 1 semestre de Projet de Fin d'Etudes (PFE) réalisé en relation avec le milieu industriel (dernier semestre du cycle ingénieur). Durant les semestres académiques, la formation est structurée en Unités d'Enseignement (UE) auxquelles sont associés des crédits ECTS. La validation d'une année est conditionnée par l'obtention de 60 crédits ECTS.

Au cours du cycle ingénieur les étudiants doivent effectuer :

- un stage d'une durée de 4 semaines au moins (6 semaines à partir de l'année académique 2018-2019) à la fin de la première année (juin, juillet, août) ;

- un stage d'une durée de 6 semaines au moins (8 semaines à partir de l'année académique 2019-2020) à la fin de la deuxième année (juin, juillet, août) ;

- un Projet de Fin d'Etudes : ce projet se déroule sur une période de 20 semaines au moins au cours du deuxième semestre de la dernière année du cycle ingénieur. Proposé par le milieu industriel et/ou de la recherche, il est encadré par les industriels et/ou les chercheurs concernés et suivi par les enseignants de l'ENSEEIHT.

Ces trois stages sont évalués par des enseignants d'après un rapport écrit rédigé par l'élève ingénieur ainsi que d'une soutenance orale, la soutenance du PFE étant la plus importante.

Pour l'obtention du diplôme, les étudiants devront :

-obtenir 300 crédits ECTS ;

- justifier un niveau d'anglais certifié équivalent au niveau européen B2 ;

- avoir effectué un séjour à l'étranger d'une durée d'au moins 12 semaines soit sous la forme d'un ou plusieurs stages, soit sous la forme d'un séjour d'études dans une université partenaire.

L'obtention d'un diplôme d'ingénieur ENSEEIHT, quelque soit la discipline, implique les qualités suivantes :

- Maîtrise des méthodes et outils de l'ingénieur et d'un large champ disciplinaire.

- Capacité à concevoir, réaliser et valider des solutions, des méthodes, des produits, des systèmes et des services.

- Aptitude à innover, entreprendre, collecter et intégrer des savoirs et à mener des projets de recherche.
- Maîtrise des enjeux de l'entreprise relatifs à son fonctionnement dans ses dimensions économique, juridique, environnementale et sociétale.
- Aptitude à s'intégrer et à travailler au sein d'une organisation multiculturelle et internationale.
- Savoir gérer sa formation et sa carrière professionnelle.

L'ingénieur INP-ENSEEIH "Informatique et Télécommunications" est un ingénieur de haut niveau technique et scientifique par la formation qu'il a suivie dans les domaines de l'informatique, des mathématiques, des télécommunications et des réseaux.

Grace au socle commun de formation, l'ingénieur INP-ENSEEIH "Informatique et Télécommunications" :

- Maîtrise les principes de conception et de fonctionnement d'un ordinateur, au niveau de son architecture, de son système d'exploitation, et de ses modèles de programmation.
- Maîtrise les différentes méthodes de développement logiciel, le respect du cahier des charges et de la qualité.
- Maîtrise les techniques associées aux éléments d'une chaîne de communication numérique : les protocoles, la conception, le déploiement, la sécurisation et l'optimisation d'un réseau.
- Connaît les mathématiques et l'algorithmique pour modéliser et résoudre des problèmes et extraire l'information pertinente des données massives structurées ou non.
- Maîtrise une infrastructure informatique, les concepts et technologies internet, le développement d'une application mobile et multimédia.
- Maîtrise la conception d'une architecture de réseau et les différents niveaux d'interaction des éléments la constituant.

Selon son parcours dans la spécialité, l'ingénieur INP-ENSEEIH "Informatique et Télécommunications" :

- Identifie, modélise et analyse un problème complexe, nécessitant le recours à des outils et méthodes informatiques et numériques ; propose, teste et valide ses solutions.
- Conçoit et exploite l'architecture d'un système complexe, tout en intégrant les enjeux de qualité et sécurisation du système.
- Elabore, met en oeuvre et évalue des algorithmes séquentiels ou parallèles, en vue de la résolution de problèmes de calcul scientifique, de traitement et d'analyse de données.
- Conçoit et met en oeuvre des technologies internet, réseaux et mobiles, des systèmes multimédia innovants, éventuellement distribués et interactifs.
- Conçoit, dimensionne et exploite l'infrastructure d'un réseau de communication en vue d'échanger des données de tous types.

Training content

L'organisation des études sous statut étudiant (FISE) est assurée sur la base d'un plein temps. Le volume est d'environ 400 heures encadrées par semestre en moyenne sur les 3 années du cycle ingénieur.

Organization

Ingénieur ENSEEIH Informatique et Télécommunications 1ère année
 Ingénieur ENSEEIH Informatique et Télécommunications 2ème année
 Ingénieur ENSEEIH Informatique et Télécommunications 3ème année

Access conditions

Selon les termes de son règlement, fixé chaque année en accord avec le Ministère chargé de l'éducation nationale, l'ENSEEIH recrute environ 380 élèves par an sous statut étudiant dont 170 dans la spécialisation Informatique et Télécommunications.

3.3.1 La majorité des étudiants recrutés en première année (78% environ) sont les lauréats de concours nationaux (Concours Communs INP) présentés à l'issue de 2 années de Classes Préparatoires aux Grandes Ecoles (CPGE). Les CPGE constituent une formation supérieure fondamentale en matières théoriques scientifiques (mathématiques, physique, technologie, sciences de l'ingénieur) auxquelles s'ajoute un enseignement en français et en langues étrangères. 10% des étudiants reçus au baccalauréat scientifique sont admis dans les CPGE. Le rythme de travail y est très soutenu : plus de 60 heures par semaine entre les cours et le travail personnel. La formation en CPGE correspond à 120 crédits ECTS.

3.3.2 Des élèves ingénieurs sont recrutés en première année sur le concours du cycle préparatoire La Prépa des INP, préparé dans les INP de France (10% environ des étudiants).

3.3.3 Après un concours sur titres, l'accès est autorisé en première année à des étudiants titulaires d'une deuxième année de Licence ou d'un DUT (12% environ des étudiants).

3.3.4 Après un concours sur titres, l'accès est également autorisé en deuxième année de l'ENSEEIH (semestre 7 du cursus d'études supérieures) à des étudiants titulaires d'une première année de Master, ou d'un diplôme étranger équivalent, pour un cycle de 4 semestres (2 années) d'études conduisant à l'obtention du diplôme d'ingénieur (5% environ de l'effectif de 2ème année).

3.3.5 Le même cursus, conduisant au diplôme d'ingénieur, peut également être suivi en alternance sous statut apprenti (20 élèves environ par an).

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

Ingénieur ENSEEIHT Informatique et Télécommunications 1ère année

MORE INFO

ECTS credits : 60

Organization

· Année 1A SN - FISE

· Sem.5-1A SN-FISE

· Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

· Subject Anglais

Pre-requisites

Aucun.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Chair a meeting in English.
- 2) Write an email and meeting minutes in English.
- 3) Write a CV & an application letter in English.

Description

A semester of 12 weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

Anglais

Bibliography

- * Palmer, A. (2013). *Talk Lean: Shorter Meetings. Quicker Results. Better Relations.* John Wiley & Sons.
- * Benson, D. (2011). *The Art of Taking Minutes.* AmazonEncore.
- * Reed, J. (2019). *The 7 Second CV: How to Land the Interview.* Penguin.

* Rubin, D (2015). *Wait, How Do I Write This Email?* News To Live By LLC.

- Second language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Portuguese

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject French as a Foreign Language

- Subject Sports

- Subject Leadership and management

Pre-requisites

None.

Objectives

Develop key professional competencies to communicate effectively, manage projects and work in international teams.

Targeted skills

- 1) Develop self-knowledge by using preference tools and indicators such as Myers Briggs
- 2) Analyze the concept of reputation and risks of social networking. Develop a professional online profile with tools such as LinkedIn.
- 3) Present yourself effectively in a telephone interview.
- 4) Define your teamwork preferences and profile by using tools and indicators such as Belbin; analyze risks and challenges such as intercultural communication, diversity, conflict management.
- 5) Complete a teamwork proposal; analyze a peer project proposal.

Description

1 semester of 12 weekly sessions aimed to develop your personal professional project.

Number of hours

21 hours

Person(s) in charge

HULL ALEXANDRA

Teaching method

En présence

Teaching language

French and English

Bibliography

- * Burnett, W., & Evans, D. J. (2016). *Designing your life: How to build a well-lived, joyful life*. Knopf.
- * Covey, S. R. (1989). *The 7 Habits of Highly Effective People*. Simon & Schuster.
- * Lencioni, P. (2006). *The five dysfunctions of a team*. John Wiley & Sons.
- * Furnham, A. (1996). The big five versus the big four: the relationship between the Myers-Briggs Type Indicator (MBTI) and NEO-PI five factor model of personality. *Personality and Individual Differences*, 21(2), 303-307.

- Teaching Unit PROGRAMMATION IMPERATIVE

Person(s) in charge

AIT AMEUR YAMINE

- Subject Programmation Impérative 1

Objectives

Specify, define and test a program using an imperative programming language offering modularity and genericity.

Targeted skills

Know how to design an algorithm using the successive refinements method in an imperative programming context (sequence, repetitions, conditionals, arrays, records, enumerations, pointers).

Know how to specify, define and test sub-programs (functions and procedures) and modules, possibly using genericity principles.

Understand and know how to use and write state-of-the-art algorithms (sort, search, etc.) and data structures (pile, file, lists, trees, etc.).

Description

Core concepts of imperative programming are taught and manipulated using a pseudo-language for recitation classes and using ADA for labs.

These concepts are: imperative algorithmics (sequence, repetitions, conditionals), refinement method, sub-program decomposition (procedures and functions) and programming modules, data structures (arrays, records, enumerations, linked structures), genericity, recursivity, tests, offensive programming (by contract) and defensive (exceptions), abstract data types, dynamic memory allocation.

Person(s) in charge

AIT AMEUR YAMINE

Teaching method

En présence

Teaching language

Français

- Subject Programmation Impérative 2

Pre-requisites

Programmation Impérative 1.

Students are asked to apply the core concepts of Programmation Impérative 1 in a larger programming project in ADA.

Objectives

Specify, define and test a program using an imperative programming language offering modularity and genericity.

Targeted skills

Know how to design an algorithm using the successive refinements method in an imperative programming context (sequence, repetitions, conditionals, arrays, records, enumerations, pointers).

Know how to specify, define and test sub-programs (functions and procedures) and modules, possibly using genericity principles.

Understand and know how to use and write state-of-the-art algorithms (sort, search, etc.) and data structures (pile, file, lists, trees, etc.).

Description

Core concepts of imperative programming are taught and manipulated using a pseudo-language for recitation classes and using ADA for labs.

These concepts are: imperative algorithmics (sequence, repetitions, conditionals), refinement method, sub-program decomposition (procedures and functions) and programming modules, data structures (arrays, records, enumerations, linked structures), genericity, recursivity, tests, offensive programming (by contract) and defensive (exceptions), abstract data types, dynamic memory allocation.

Person(s) in charge

AIT AMEUR YAMINE

Teaching method

En présence

Teaching language

Français

- Teaching Unit INTEGRATION ET APPLICATIONS - PROBABILITES

Person(s) in charge

TOURNERET JEAN-YVES

- Subject Intégration et Applications

Person(s) in charge

GRATTON SERGE

- Subject Probabilités

Pre-requisites

Probability bases (conditional probabilities, theorem of total probabilities, Bayes theorem), Calculus of integrals and series, change of variables, basic elements of linear algebra

Objectives

Understand how to define discrete and continuous random variables and the related basic tools (mathematical expectation, probability density function, cumulative distribution function, characteristic function, change of variables)

Understand how to define random vectors and how to compute marginal distributions, conditional distributions, mathematical expectations with a particular interest to the covariance and the correlation coefficient. Understand the different steps required for changes of variables for random vectors.

Understand how standard probabilistic notions simplify for random Gaussian vectors (margins and conditional distributions, affine transformations, independence). Introduce chi-square, Student and Fisher distributions.

Understand the different notions of convergence (in distribution, in probability, in the mean square sense) and the interest of the law of large numbers and the central limit theorem.

Targeted skills

Computation of probabilities for random variables and vectors

Properties of Gaussian vectors

Notions of convergence for sequences of random variables

Description

- Definition of a probability space
- Discrete and continuous random variables
- Random vectors
- Gaussian vectors
- Convergence and limit theorems

Number of hours

6 lectures of 1h45 + 4 exercise sessions of 1h45 + 3 practical sessions of 1h45

Person(s) in charge

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CHARVILLAT Vincent
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TOURNERET JEAN-YVES

Teaching method

En présence

Teaching language

French

Bibliography

1 . Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variable and Stochastic Processes, McGraw Hill Higher Education, 4th edition, 2002.

- Teaching Unit ANALYSE NUMERIQUE ET STATISTIQUES

Person(s) in charge
TOURNERET JEAN-YVES

- Subject Optimisation - E.D.P.

Person(s) in charge
RUIZ DANIEL

- Subject Statistiques

Pre-requisites

Bases of probability theory, computation of integrals and series, bases of optimization theory and of linear algebra

Objectives

Understand how to define a statistical model, to determine the main properties of estimators of the model parameters and finally to implement standard estimation methods (maximum likelihood, methods of moments, Bayesian estimators, confidence intervals)

Understand the concept of statistical test, how we can evaluate the performance of a test and how the Neyman Pearson theorem can be applied to binary hypothesis problems.

Understand the principles of goodness of fit tests (chi-square and Kolmogorov)

Targeted skills

Principles of statistical estimation and of hypothesis testing

Description

Estimation

- Statistical model and properties of estimators
- Cramér-Rao inequality
- Maximum likelihood
- Method of Moments
- Bayesian estimation
- Confidence intervals

Binary hypothesis tests

- Probability of false alarm, of detection and receiver operational characteristics (ROCs)
- Neyman Pearson theorem
- Chi-square and Kolmogorov tests

Number of hours

6 lectures of 1h45 + 4 exercise sessions of 1h45 + 3 practical sessions of 1h45

Person(s) in charge
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TOURNERET JEAN-YVES

Teaching method

En présence

Teaching language

french

Bibliography

Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variable and Stochastic Processes, McGraw Hill Higher Education, 4th edition, 2002.

- Teaching Unit TRAITEMENT DU SIGNAL ET AUTOMATIQUE

- Subject Traitement du Signal

Pre-requisites

Bases on deterministic signals (energy, power, periodicity)

Random variables and vectors

Objectives

Two parts in this course: 1) Introduce theoretical tools for signal processing, 2) Digital signal processing (implementation).

Objectives for the first part (theoretical tools) :

- Understand the different classes of deterministic and random signals with the definitions of the autocorrelation function and the power spectrum density
- Understand the concept of linear filtering and the Wiener Lee relationships
- Understand the principles of sampling and the Shannon theorem
- Understand the interest of non-linear transformations applied to deterministic and random signals and how to apply Price's theorem

Objectives for the second part (digital signal processing) :

- To be able to correctly sample a signal and to generate simple digital signals.
- To be able to estimate digitally the autocorrelation function and to perform a frequency representation (Fourier transform, Power Spectral Density) of a signal.
- To be able to determine impulse responses for simple filters (Finite Impulse Response, or FIR, filters) and to synthesize them, meaning to choose their parameters to meet some requirements.
- To be able to filter a signal and to analyze the obtained result.

Targeted skills

For the first part (theoretical tools) :

Computation of autocorrelation functions and power spectrum densities for deterministic signals and stationary random processes

Shannon theorem

Compute the autocorrelation function and the power spectrum density at the output of a linear filter

Apply Parseval's theorem to stationary random processes

For the second part (digital signal processing) :

- Perform a basic signal analysis using digital estimations in terms of autocorrelation function, Fourier Transform, Power Spectral Density.

- Implement simple digital filters (FIR) to analyze, generate or modify signals.

Description**For the first part (theoretical tools) :**

- Autocorrelation and power spectral density

- Sampling

- Linear Filtering

- Non-linear transformations and Parseval's theorem

For the second part (digital signal processing) :

- Sampling and quantization.

- From theoretical to digital tools for the autocorrelation function and the Fourier transform : what are the approximations to be done ? what are their consequences ?

- Digital filters (FIR and IIR) and FIR synthesis.

Number of hours

7 lectures, 7 sessions of practical work

Person(s) in charge

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THOMAS NATHALIE

Teaching method

En présence

Teaching language

french

Bibliography

- Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variable and Stochastic Processes, McGraw Hill Higher Education, 4th edition, 2002.

- Simon Haykin and Barry Van Veen, Signal and Systems, Wiley Alan V. Oppenheim and Ronald W. Schafer, Digital Signal Processing, Prentice-Hall.

- Subject Automatique

Person(s) in charge
SINGH NEERAJ

- Teaching Unit SOUTIEN-1A-SN - Semestre 5

Optional :

- Subject Soutien en Mathématique - 1A SN - Semestre 5

- Subject Environnement Informatique

- Teaching Unit MODELISATION ET ARCHITECTURE

Person(s) in charge
PANTEL MARC

- Subject Architecture des Ordinateurs

Person(s) in charge
BUISSON JEAN CHRISTOPHE

- Subject Modélisation

Person(s) in charge
PANTEL MARC

- Semestre 6 à l'N7-1A SN-FISE

- Teaching Unit Upgrade

Person(s) in charge
HULL ALEXANDRA

- Subject English

Pre-requisites

None

Objectives

Develop professional communication competencies by completing key written and oral tasks in English.

Targeted skills

- 1) Design and create an infographic poster in English.
- 2) Present a team project in a poster session in English.
- 3) Write a constructive criticism SWOT-type feedback paper in English.

Description

1 semester of 12 interactive, weekly sessions in English.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

- * Krum, R. (2013). *Cool Infographics: Effective Communication with Data Visualization and Design*. Wiley.
- * Gallo, C. (2009). *The Presentation Secrets of Steve Jobs. How To Be Insanely Great In Front Of Any Audience*. McGraw-Hill Education.
- * Bright, D. (2014). *The Truth Doesn't Have to Hurt: How To Use Criticism To Strengthen Relationships, Improve Performance And Promote Change*. AMACOM.

- Second language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Portuguese

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject French as a Foreign Language

- Subject Sports

- Subject Leadership and management

Pre-requisites

None.

Objectives

Develop key professional competencies to communicate effectively, manage projects and work in international teams.

Targeted skills

- 1) Explore the concept of civic engagement and professional skills development.
- 2) Present a team civic engagement project in English in an infographic poster session.
- 3) Develop a personalized digital portfolio for personal, professional project (PPP) artifacts.
- 4) Design and create a video pitch to showcase and explain M1 options chosen.

Description

1 semester of 12 weekly sessions aimed to develop students' personal professional projects.

Number of hours

10.5 hours

Teaching method

En présence

Teaching language

French and English

Bibliography

- * Chhabra, S. (2018). *Handbook of Research on Civic Engagement and Social Change in Contemporary Society*. Information Science Reference.
- * Krum, R. (2013). *Cool infographics: Effective communication with data visualization and design*. John Wiley & Sons.
- * Hartnell-Young, E., & Morriss, M. (2006). *Digital portfolios: Powerful tools for promoting professional growth and reflection*. Corwin Press.
- * Westfall, C. (2012). *The New Elevator Pitch: The Definitive Guide to Persuasive Communication in the Digital Age*. BookBaby.

- Teaching Unit TELECOMMUNICATIONS

Pre-requisites

Bases on signal processing

Objectives

- To be able to explain the role of the different elements in a communication channel allowing to transmit a digital information.
- To be able to analyze a basic digital transmission channel (modulation/demodulation on a Additive white Gaussian noise channel) in terms of spectral and power efficiencies.

- To be able to implement basic digital transmission channels, to compare and optimize them in terms of spectral and power efficiencies.

Description

The following issues shall be addressed by this teaching unit:

- 1- Role of the different elements in a communication channel allowing to transmit a digital information.
- 2- Generation of a signal allowing to transmit a binary information (digital modulation) :
 - for a baseband transmission,
 - for a transmission on a carrier frequency (ASK, PSK, QAM modulations),
 - notion of spectral efficiency.
- 3- Basic modulation for the transmission channel.
- 4- Definition of an optimized digital demodulator :
 - power efficiency,
 - interference between symbols and Nyquist criterion,
 - matched filtering.
- 5- Bit error rate computation.
- 6- Notion of complex envelope and equivalent lowpass channel for transmissions on carrier frequencies.
- 7- Example of a basic digital transmission channel : DVB-S physical layer.

Number of hours

7 lectures, 4 sessions of exercises, 11 sessions of practical work, 5 sessions of project

Person(s) in charge

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THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

J. G. Proakis, Digital Communications, Mc Graw Hill Book Cie

- Subject Télécommunications

Pre-requisites

Bases on signal processing

Objectives

- To be able to explain the role of the different elements in a communication channel allowing to transmit a digital information.
- To be able to analyze a basic digital transmission channel (modulation/demodulation on a Additive white Gaussian noise channel) in terms of spectral and power efficiencies.

- To be able to implement basic digital transmission channels, to compare and optimize them in terms of spectral and power efficiencies.

Targeted skills

Understand the role of the different elements in a communication channel allowing to transmit a digital information.

Being able to implement and optimize the modulator/demodulator of a communication channel allowing to transmit a digital information when the channel is an AWGN (Additive White Gaussian Noise) channel.

Description

1- Role of the different elements in a communication channel allowing to transmit a digital information.

2- Generation of a signal allowing to transmit a binary information (digital modulation) :

- for a baseband transmission,

- for a transmission on a carrier frequency (ASK, PSK, QAM modulations),

- notion of spectral efficiency.

3- Basic modulation for the transmission channel.

4- Definition of an optimized digital demodulator :

- power efficiency,

- interference between symbols and Nyquist criterion,

- matched filtering.

5- Bit error rate computation.

6- Notion of complex envelope and equivalent lowpass channel for transmissions on carrier frequencies.

7- Example of a basic digital transmission channel : DVB-S physical layer.

Number of hours

7 lectures, 4 sessions of exercises, 11 sessions of practical work, 5 sessions of project

Person(s) in charge

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THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

J. G. Proakis, Digital Communications, Mc Graw Hill Book Cie

- Teaching Unit RESEAUX

Person(s) in charge

FASSON JULIEN

- Subject Réseaux

Person(s) in charge
FASSON JULIEN

- Teaching Unit CALCUL SCIENTIFIQUE ET ANALYSE DE DONNEES

Person(s) in charge
SIMON EHOARN

- Subject Calcul Scientifique

Person(s) in charge
SIMON EHOARN

- Subject Analyse des données

Person(s) in charge
CHARVILLAT VINCENT

- Teaching Unit TECHNOLOGIE OBJET

Person(s) in charge
CREGUT XAVIER

- Subject Technologie Objet

Objectives

To learn object-oriented programming using UML and Java languages.

Description

Main concepts of object-oriented programming are taught: modularity (class, object, fields, methods, constructors, visibility, etc.), abstraction (interfaces, inheritance, abstract classes, static and dynamic binding, etc.), genericity, exceptions, collections, design patterns, event programming (through graphical user interface programming), unit tests.

A project is done using the SCRUM method (from « Project Management » module) with team of 5 to 7 students on a topic they choose at the beginning on the project.

Person(s) in charge
CREGUT XAVIER

Bibliography

- B. Eckel, Thinking in Java. Prentice-Hall, 3 ed., 2002.

- J. Gosling, B. Joy, G. Steele, and G. Bracha, The Java Language Specification. Addison-Wesley, 3 ed., Mar. 2005. <http://java.sun.com/docs/books/jls/>

- B. Meyer, Object-oriented software construction. Prentice Hall, 2 nd ed., 1997.

- M. Fowler, UML 2.0. CampusPress Référence, 2004.

- Teaching Unit ARCHITECTURE ET SYSTEMES

Person(s) in charge
ERMONT JEROME

- Subject Systèmes d'exploitation centralisés

Person(s) in charge
MAURAN PHILIPPE

- Subject Architecture des Ordinateurs

Person(s) in charge
BUISSON JEAN CHRISTOPHE

- Subject Langage C

Pre-requisites

Programmation Impérative 1 et 2 competences are required:

#- Algorithmic language,

#- Program design with successive raffinements method,#

- Fonctions and procedures,

#- User data types (records, enumeration and arrays),

#- Modules and genericity,

#- Dynamic memory allocation,

#- Dynamic data structures,

#- Abstract data types.

Objectives

Read, understand and write the concepts of imperative programming in C langage.

Targeted skills

- Write functions and procedures in C (parameter passing by value or by address).

- Define modules in C (.h et .c), in a generic manner if possible.

#- Understand compilation and link edition steps ; manipulate make.

#- Allocate dynamic memory and know when to deallocate.#

- Manipulate entries and outputs, files.

Description

This class is divided in two parts:#

- Part 1 : Introduction to C language (types, constants, control structures, user types, strings, pointers) and concept of functions and procedures in C.

#This part is composed of one CM, one TD ans one TP that take place in semestre 5.

#- Part 2 : Modules, make and dynamic memory allocation in C.#

This part is composed of one CM, one TD ans one TP that take place in semestre 6.

This C language class isn't evaluated, but is a pre-requisite for the operating systems class of semester 6.

Person(s) in charge
JAFFRES-RUNSER KATIA

- Teaching Unit SOUTIEN-1A SN-Semestre 6

Optional :

- Subject Soutien en Mathématique - Semestre 6-1A SN

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

Ingénieur ENSEEIHT Informatique et Télécommunications 2ème année

MORE INFO

ECTS credits : 60

Organization

- Année 2A SN-FISE

- Choix de Parcours - Semestre 7-2A-SN-FISE

Choice: 1 Among 1 :

- Sem 7 SN Parc. Programme Insertion Méthodologique (PIM)

- Choix d'UE Scientifique-SN

Choice: 3 Among 3 :

- Teaching Unit IDM ET INTERGICIELS

Person(s) in charge
OUEDERNI MERIEM

- Subject Intergiciel dirigée par les modules

Person(s) in charge
CREGUT XAVIER

- Subject Intergiciels

Person(s) in charge
OUEDERNI MERIEM

- Subject Introduction aux Applications Web

Person(s) in charge
HAGIMONT DANIEL

- Teaching Unit COMMUNICATIONS NUMERIQUES SUR CANAUX SELECTIFS

Pre-requisites

Bases on telecommunications

Objectives

To be able to define a more complete channel modelization, compared to the one studied during the first year teaching unit "Bases on Telecommunications".

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Equalization,
- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching unit presents the telecommunication network physical layer solutions allowing to communicate on time varying and frequency selective channels: equalization, OFDM and CDMA. These solutions are currently used in several telecommunication systems, such as, for example, 3G, 4G, WiFi, ADSL and Digital Terrestrial TV. They rely on channel models described in the first teaching module.

Number of hours

17 lectures, 2 sessions of exercises, 8 sessions of practical work

Person(s) in charge

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- John. G. Proakis, Masoud Salehi, « Digital Communications », McGraw-Hill Education, 5th edition (November 6, 2007)
- Sergio Benedetto, Ezio Biglieri, « Principles of digital transmission : with wireless applications », Published in 1999 in New York (N.Y.) by Kluwer Academic/Plenum publishers.
- Raymond Steele, Lajos Hanzo, « Mobile Radio Communications », 2nd Edition, July 1999, Wiley-IEEE Press.
- J. R. Barry, E. A. Lee, and D. G. Messerschmitt, « Digital Communication », 3rd ed., Boston, MA: Kluwer Academic Publishers, 2003.
- B.P. Lathi and Zhi Ding, « Modern Digital and Analog Communication », International 4th ed. New York ; Oxford : Oxford University Press - Oxford series in electrical and computer engineering, 2010.
- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition,» Springer, 2015.
- Henrik Schulze and Christian Lüders, «Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Subject Modélisation de Canal

Person(s) in charge

COULON MARTIAL

- Subject Egalisation de Canal

Objectives

The objective of this course is to present detection and estimation methods in the context of frequency selective channels. A particular attention will be given to linear and nonlinear equalization methods with both time-domain or frequency-domain implementation for single-carrier communication systems.

Targeted skills

- To understand the fundamentals of detection and estimation techniques for frequency-selective channel transmissions;
- To be able to derive the discrete baseband equivalent model of a digital communication schemes for a frequency-dispersive channel;
- To know the main methods for detection and equalization;
- To know how to implement a detector and/or equalizer;
- To know how to select the parameters of the different methods to manage the performance/complexity trade-off.

Description

This course presents the methods for detection and estimation over frequency selective channels. The following points will be addressed:

- Modeling frequency selective channels: equivalent discrete baseband channel models, Forney vs Ungerböeck observation model;
- Time domain linear equalization: ZF and MMSE criteria for non-constrained RII filter and RIF;
- Nonlinear equalization: maximum likelihood detection (trellis, Viterbi Algorithm); non-linear filter-based or block-based detection(DFE) ;
- Frequency domain linear equalization : block circular single-carrier waveform; frequency domain equalization (ZF, MMSE); spectral shaping (OFDM precoded SC-OFDM / DFT, EW-SC-OFDM);

The practical lab. sessions are dedicated to the implementation of the algorithms and models seen in this course.

Number of hours

7 courses, 2 Practice Lab courses

Person(s) in charge

POULLIAT CHARLY

Teaching method

En présence

Teaching language

French

Bibliography

- [1] B. P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 2009.
- [2] John Barry, Edward Lee, David Merserschnitt, Digital Communications, Kluwer Academic Publisher, Third edition.
- [3] Andreas F. Molisch, Wireless Communications, 2nd Edition,IEEE Press-Wiley, 2010.
- [4] Digital Communications, 4th edition, John G. Proakis, Mc Graw-Hill.
- [5] J. Choi, Adaptive and Iterative Signal Processing in Communications, Cambridge University Press, 2006.
- [6] Zhi Ding and Ye Li, Blind Equalization and Identification , Marcel Dekker, New York, 2001.

- Subject OFDM/CDMA

Pre-requisites

Bases on telecommunications

Objectives

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching introduces Orthogonal Frequency Division Multiplexing (OFDM) and Code Division Multiple Access (CDMA), two techniques allowing to transmit on a frequency selective channel and widely used in several communication standards (for 3G, 4G, WiFi, l'ADSL, DTTV...).

Number of hours

6 lectures, 4h of practical work

Person(s) in charge

THOMAS Nathalie
Nathalie.Thomas@enseeiht.fr
Phone 2236

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition, Springer, 2015.
- Henrik Schulze and Christian Lüders, « Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Teaching Unit COMMUNICATION NUMERIQUES CODEES

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cycle codes

- be able to code and decode the proposed codes
- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the problematic of data compression
- be able to implement a mobile communications chain and evaluate its performance on MATLAB software

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)
- be able to model and analyze the communication chain obtained using MATLAB software
- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver

Description

The first part of this unit is devoted to channel coding, and more specifically to the study of convolutional and cyclic codes.

This first part is followed by an introduction to digital receivers and data compression.

The last part of the EU is devoted to the sizing and implementation under MATLAB of a communications chain encoded on a frequency-selective channel.

Number of hours

64

Person(s) in charge

BOUCHERET Marie-laure
Marie-Laure.Boucheret@enseeiht.fr
Phone 2229

MAILHES Corinne
Corinne.Mailhes@enseeiht.fr
Phone 2237

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

- « Digital communications », John Proakis, McGraw-Hill Higher Education
- « Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

• Subject Codage canal

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cyclic codes
- be able to encode and decode the proposed codes

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)

Description

This module is dedicated to channel coding, and more specifically to the study of convolutional and cyclic codes:

- convolutional codes: state diagram, Viterbi algorithm, punching
- cyclic codes: Galois body, binary BCH codes, Reed-Solomon codes
- concatenated codes

Person(s) in charge

BOUCHERET Marie-laure
Marie-Laure.Boucheret@enseeiht.fr
Phone 2229

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

« Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

- Subject Récepteurs

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Targeted skills

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Description

This section is devoted to an introduction to digital receivers :

- need for time-frequency synchronization (+ phase in the Gaussian channel) and channel estimation
- block diagram of a satellite receiver
- channel estimation (single and multi-carrier)

Person(s) in charge

BOUCHERET Marie-laure
Marie-Laure.Boucheret@enseeiht.fr

Phone 2229

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

- Subject Source Coding

Pre-requisites

Probabilities. Matrix computation

Objectives

Understand what is source coding: lossless or lossy coding methods: lossless linked to information theory and lossy methods based on signal processing, with the 2 big families, predictive coding and transform coding.

Targeted skills

Be able to ask the good questions for source coding: with or without distortion? And with distortion, which family of methods?

Description

I. Introduction

II. Lossless coding : basis (information theory in short), Huffman coding, based-dictionary methods, arithmetic coding

III. Lossy coding: the importance of scalar quantization

IV. Lossy coding: predictive coding

V. Lossy coding: transform coding

Number of hours

3 CM de 1h45 + 2 TD de 1h45

Person(s) in charge

MAILHES Corinne

Corinne.Mailhes@enseeiht.fr

Phone 2237

MAILHES CORINNE

Teaching method

En présence

- Subject Projet

Pre-requisites

N7EN02 Digital communications on selective channels

N7EN03A Channel coding

Objectives

- be able to dimension a communication chain on a selective channel (fixed/mobile) according to specifications

- be able to implement this communication chain

- be able to evaluate its performance using MATLAB software

Targeted skills

-be able to design and analyze a communication chain on a selective channel using MATLAB software

Description

This module is dedicated to the dimensioning and implementation using MATLAB of a coded communication chain on a frequency-selective channel. The performance of the chain will also be evaluated.

Person(s) in charge

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

· Teaching Unit RESEAUX LOCAUX ET DE TELECOMMUNICATIONS

Description

This teaching unit is dedicated to Local Area Networks and Telecom Networks:

- in the context of Local Area Networks, we mainly focus on Ethernet architecture and its evolution. The second part is dedicated to bridging.

- in the context of Telecom Networks, we will present the different solutions for circuit and packet switching networks.

The main objectives of this course are to understand the principles, the architecture and the protocols of these networks.

Person(s) in charge

BEYLOT ANDRE LUC

Bibliography

Les Réseaux, Guy Pujolle, Eyrolles, Edition 2018

Réseaux Locaux et Internet, Laurent Toutain, Hermès

· Subject Réseaux Locaux

Person(s) in charge

PAILLASSA BEATRICE

· Subject Réseaux de Télécommunications

Person(s) in charge

BEYLOT ANDRE LUC

- Teaching Unit ARCHITECTURE DES ORDINATEURS

Objectives

VHDL will be presented through examples of components. We will study its specific features (signals, parallel execution). Examples with

increasing complexity will be considered, up to the design of the components of a computer (mini-processor, UART, memory hierarchy, ...). These components will be emulated on an FPGA. A project will consider a more complex example. In a second part, we will summarize the evolution towards multiprocessor architecture

Person(s) in charge

SCHARBARG JEAN LUC

Bibliography

- Architecture des Ordinateurs : une approche quantitative (J.L. Hennessy et D.A. Patterson - Thomson Publishing)
- VHDL - langage, modélisation, synthèse (R. AIRIAU et al. - Presses Polytechniques et Universitaires Romandes)

- Subject Architecture des Ordinateurs

Person(s) in charge

SCHARBARG JEAN LUC

- Teaching Unit BASE DE LA PROGRAMMATION FONCT ET TRADUCTION DES LANGAGES

Objectives

The objective of the UE is twofold. The student must master the principles of algorithmic and without side effect programming using functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. It must be able to handle lists and iterators, as well as modules and functors. The associated programming language is the OCaml language.

He must also master the different stages of language translation: lexical analysis, syntactic analysis and semantic analysis. In the particular case of compilation, he must know four phases of the semantic analysis: the resolution of the identifiers thanks to a table of symbols, the typing, the memory placement of the variables and the code generation. The student will create a compiler that will take a sub-part of C into input language, which will produce code for an abstract stack machine. The compiler will itself be written in OCaml.

Person(s) in charge

HURAUULT AURELIE

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailloux, Pascal Manoury, Bruno Pagano

- Purely Functional Data Structures, Chris Okasaki, 1999
- Compilers: Principles, Techniques, and Tools (dragon book), Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman,, 2007

• Subject Programmation Fonctionnelle

Person(s) in charge
HURALT AURELIE

• Subject Traduction des Langages

Person(s) in charge
HURALT AURELIE

• Subject PF et TDL

Person(s) in charge
HURALT AURELIE

• Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013
- * Fred B. Schneider : On Concurrent Programming, Springer, 1997

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données Réparties

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit THEORIE DES AUTOMATES ET DES LANGAGES, THEORIE DES GRAPHES

Objectives

The objective of the UE is twofold. The student must master the formalisms of finite automata, stack automata and Turing machine for the modeling of state based systems and the implementation of lexical and syntactic analyses. He is also introduced to the computability and complexity theories.

The student must also master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Person(s) in charge
MORIN GÉRALDINE

Bibliography

- Olivier Carton, Langages formels, calculabilité et complexité, Vuibert, 2008 (ISBN 978-2-7117-2077-4)
- Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013). Introduction to Automata Theory, Languages, and Computation(3rd ed.). Pearson. ISBN 1292039051.
- Ferdinand Wagner, Ruedi Schmuki, Thomas Wagner et Peter Wolstenholme, Modeling Software with Finite State Machines : A Practical Approach, Auerbach Publications, 2006, 392 p. (ISBN 9780849380860).
- * Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Subject Automates

Person(s) in charge
PANTEL MARC

- Subject Graphes

Pre-requisites

Programming skills in ocaml

Objectives

The student must master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Description

Chapter 1 : Definitions and basic concepts

Chapter 2 : Graph connexity

Chapter 3 : Euler and Hamilton graphs

Chapter 4 : Exploring graphs

Chapter 5 : Graph coloring and Planar graphs

Each chapter is studied in class and related exercices are proposed.

5 labs are dedicated to the project.

Number of hours
5 cours-TD, 5 TP

Person(s) in charge
MORIN GÉRALDINE

Bibliography

* Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Teaching Unit GENIE DU LOGICIEL ET DES SYSTEMES

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Person(s) in charge
CREGUT XAVIER

Bibliography

- Gamma, Erich; Richard Helm, Ralph Johnson, and John Vlissides (1995). Design Patterns : Elements of Reusable Object-Oriented Software. Addison-Wesley. ISBN 0-201-63361-2.
- Mark Grand. Patterns in Java: A Catalog of Reusable Design Patterns Illustrated with UML, volume 1. Wiley, 2 edition, 2002.
- Sommerville, Ian (2007) [1982]. Software Engineering (8th ed.). Harlow,England : Pearson Education. ISBN 0-321-31379-8
- Model-Driven Software Development : Technology, Engineering, Management (Wiley Software Patterns Series) Thomas Stahl, Markus Voelter, ISBN0-470-02570-0.
- EMF: Eclipse Modeling Framework 2.0 2nd, David Steinberg, Frank Budinsky, Marcelo Paternostro, Ed Merks, Addison-Wesley Professional, 2009 ISBN : 0321331885.

- Subject Génie du Logiciel et des Systèmes

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Description

The first part presents main principles of Model-Driven Engineering (MDE): metamodelling (EMF), static semantics (OCL), textual (Xtext) or graphical (Sirius) concrete syntaxes, model to text transformations (Acceleo), model to model transformations (EMF/Java and ATL). A running example is used to illustrate all these concepts and tools.

The second part deals with design patterns, reflection, annotations and test.

Person(s) in charge
CREGUT XAVIER

- Teaching Unit OPTIMISATION ET R.O.

Person(s) in charge
RUIZ DANIEL

Bibliography

F.S. Hillier, G.J. Liebermann Operations Research - Mc Graw Hill, Eighth Edition, 2005

- Subject Optimisation

Person(s) in charge
RUIZ DANIEL

- Subject Recherche Opérationnelle

Person(s) in charge
MARTHON PHILIPPE

- Teaching Unit PROGRAMMATION FONCTIONNELLE

Objectives

The objective of the UE is to master the principles of algorithmic and side effect free functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. He can handle lists, tree-like data structures and their iterators, but also lazy structures such as streams. He can design and give structure to applications through the use of modules, functors and advanced typing schemes. The associated programming language is the OCaml language.

Person(s) in charge
THIRIOUX XAVIER

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailloux, Pascal Manoury, Bruno Pagano
- Purely Functional Data Structures, Chris Okasaki, 1999

- Subject Programmation Fonctionnelle

Description

Please refer to the UE syllabus, as this is the sole topic in the UE.

Person(s) in charge
THIRIOUX XAVIER

- Teaching Unit INTERNET ET GRAPHERS

Person(s) in charge
FASSON JULIEN

- Subject Internet

Person(s) in charge
CHAPUT EMMANUEL

- Subject Projet Interconnexion

Person(s) in charge
FASSON JULIEN

- Subject Théorie des graphes

Person(s) in charge
DHAOU RIADH

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

* Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.

* Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.

* Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject French as a Foreign Language

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit FRANCAIS LANGUE ETRANGERE (FLE (PIM))

- Teaching Unit PROJET FLE (PIM)

- Semestre 7 CESURE

- Semestre 7 SN FISE Parcours Architecture Système et Réseaux

Person(s) in charge
JAKLLARI GENTIAN

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

* Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.

* Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.

* Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

· **Subject Spanish**

· **Subject Chinese**

· **Subject Italian**

· **Subject Japanese**

· **Subject Russian**

· **Subject German**

· **Subject French as a Foreign Language**

· **Subject Sports**

· **Subject Leadership & Management**

Person(s) in charge
HULL ALEXANDRA

· **Teaching Unit RESEAUX LOCAUX ET DE TELECOMMUNICATIONS**

Description

This teaching unit is dedicated to Local Area Networks and Telecom Networks:

- in the context of Local Area Networks, we mainly focus on Ethernet architecture and its evolution. The second part is dedicated to bridging.

- in the context of Telecom Networks, we will present the different solutions for circuit and packet switching networks.

The main objectives of this course are to understand the principles, the architecture and the protocols of these networks.

Person(s) in charge
BEYLOT ANDRE LUC

Bibliography

Les Réseaux, Guy Pujolle, Eyrolles, Edition 2018

Réseaux Locaux et Internet, Laurent Toutain, Hermès

· **Subject Réseaux Locaux**

Person(s) in charge
PAILLASSA BEATRICE

- Subject Réseaux de Télécommunications

Person(s) in charge
BEYLOT ANDRE LUC

- Teaching Unit ARCHITECTURE DES ORDINATEURS

Objectives

VHDL will be presented through exemples of components. We will study its specific features (signals, parallel execution).
Examples with

increasing complexity will be considered, up to the design of the components of a computer (mini-processor, UART, memory hierarchy, ...). These components will be emulated on an FPGA. A project will consider a more complex example. In a second part, we will summarize the evolution towards multiprocessor architecture

Person(s) in charge
SCHARBARG JEAN LUC

Bibliography

- Architecture des Ordinateurs : une approche quantitative (J.L. Hennessy et D.A. Patterson - Thomson Publishing)
- VHDL - langage, modélisation, synthèse (R. AIRIAU et al. - Presses Polytechniques et Universitaires Romandes)

- Subject Architecture des Ordinateurs

Person(s) in charge
SCHARBARG JEAN LUC

- Teaching Unit BASE DE LA PROGRAMMATION FONCT ET TRADUCTION DES LANGAGES

Objectives

The objective of the UE is twofold. The student must master the principles of algorithmic and without side effect programming using functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. It must be able to handle lists and iterators, as well as modules and functors. The associated programming language is the OCaml language.

He must also master the different stages of language translation: lexical analysis, syntactic analysis and semantic analysis. In the particular case of compilation, he must know four phases of the semantic analysis: the resolution of the identifiers thanks to a table of symbols, the typing, the memory placement of the variables and the code generation. The student will create a compiler that will take a sub-part of C into input language, which will produce code for an abstract stack machine. The compiler will itself be written in OCaml.

Person(s) in charge
HURAUULT AURELIE

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailloux, Pascal Manoury, Bruno Pagano
- Purely Functional Data Structures, Chris Okasaki, 1999
- Compilers: Principles, Techniques, and Tools (dragon book), Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman., 2007

- Subject Programmation Fonctionnelle

Person(s) in charge
HURAUULT AURELIE

- Subject Traduction des Langages

Person(s) in charge
HURAUULT AURELIE

- Subject PF et TDL

Person(s) in charge
HURAUULT AURELIE

- Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012

* M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013

* Fred B. Schneider : On Concurrent Programming, Springer, 1997

* George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair : Distributed Systems - Concepts and Design, Addison Wesley 2011

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données Réparties

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge

MAURAN PHILIPPE

- Teaching Unit INTERNET ET GRAPHERS

Person(s) in charge
FASSON JULIEN

- Subject Internet

Person(s) in charge
CHAPUT EMMANUEL

- Subject Projet Interconnexion

Person(s) in charge
FASSON JULIEN

- Subject Théorie des graphes

Person(s) in charge
DHAOU RIADH

- Semestre 7 SN FISE Parcours HPC et Big Data

Person(s) in charge
GRATTON SERGE

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).

3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

* Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.

* Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.

* Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- **Subject Spanish**

- **Subject Spanish**

- **Subject Chinese**

- **Subject Italian**

- **Subject Japanese**

- **Subject Russian**

- **Subject German**

- **Subject French as a Foreign Language**

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit BASE DE LA PROGRAMMATION FONCT ET TRADUCTION DES LANGAGES

Objectives

The objective of the UE is twofold. The student must master the principles of algorithmic and without side effect programming using functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. It must be able to handle lists and iterators, as well as modules and functors. The associated programming language is the OCaml language.

He must also master the different stages of language translation: lexical analysis, syntactic analysis and semantic analysis. In the particular case of compilation, he must know four phases of the semantic analysis: the resolution of the identifiers thanks to a table of symbols, the typing, the memory placement of the variables and the code generation. The student will create a compiler that will take a sub-part of C into input language, which will produce code for an abstract stack machine. The compiler will itself be written in OCaml.

Person(s) in charge
HURAUULT AURELIE

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailoux, Pascal Manoury, Bruno Pagano
- Purely Functional Data Structures, Chris Okasaki, 1999
- Compilers: Principles, Techniques, and Tools (dragon book), Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman,, 2007

- Subject Programmation Fonctionnelle

Person(s) in charge
HURAUULT AURELIE

- Subject Traduction des Langages

Person(s) in charge
HURAUULT AURELIE

- Subject PF et TDL

Person(s) in charge
HURAUULT AURELIE

- Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013
- * Fred B. Schneider : On Concurrent Programming, Springer, 1997
- * George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair : Distributed Systems - Concepts and Design, Addison Wesley 2011

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject **Projet Données Réparties**

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit **THEORIE DES AUTOMATES ET DES LANGAGES, THEORIE DES GRAPHES**

Objectives

The objective of the UE is twofold. The student must master the formalisms of finite automata, stack automata and Turing machine for the modeling of state based systems and the implementation of lexical and syntactic analyses. He is also introduced to the computability and complexity theories.

The student must also master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Person(s) in charge
MORIN GÉRALDINE

Bibliography

- Olivier Carton, Langages formels, calculabilité et complexité, Vuibert, 2008 (ISBN 978-2-7117-2077-4)
- Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013). Introduction to Automata Theory, Languages, and Computation(3rd ed.). Pearson. ISBN 1292039051.
- Ferdinand Wagner, Ruedi Schmuki, Thomas Wagner et Peter Wolstenholme, Modeling Software with Finite State Machines : A Practical Approach, Auerbach Publications, 2006, 392 p. (ISBN 9780849380860).
- * Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Subject **Automates**

Person(s) in charge

- Subject Graphes

Pre-requisites

Programming skills in ocaml

Objectives

The student must master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Description

Chapter 1 : Definitions and basic concepts

Chapter 2 : Graph connexity

Chapter 3 : Euler and Hamilton graphs

Chapter 4 : Exploring graphs

Chapter 5 : Graph coloring and Planar graphs

Each chapter is studied in class and related exercices are proposed.

5 labs are dedicated to the project.

Number of hours

5 cours-TD, 5 TP

Person(s) in charge

MORIN GÉRALDINE

Bibliography

* Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Teaching Unit GENIE DU LOGICIEL ET DES SYSTEMES

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Person(s) in charge

CREGUT XAVIER

Bibliography

- Gamma, Erich; Richard Helm, Ralph Johnson, and John Vlissides (1995). Design Patterns : Elements of Reusable Object-Oriented Software. Addison-Wesley. ISBN 0-201-63361-2.
- Mark Grand. Patterns in Java: A Catalog of Reusable Design Patterns Illustrated with UML, volume 1. Wiley, 2 edition, 2002.
- Sommerville, Ian (2007) [1982]. Software Engineering (8th ed.). Harlow,England : Pearson Education. ISBN 0-321-31379-8
- Model-Driven Software Development : Technology, Engineering, Management (Wiley Software Patterns Series) Thomas Stahl, Markus Voelter, ISBN0-470-02570-0.

• EMF: Eclipse Modeling Framework 2.0 2nd, David Steinberg, Frank Budinsky, Marcelo Paternostro, Ed Merks, Addison-Wesley Professional, 2009 ISBN : 0321331885.

- Subject Génie du Logiciel et des Systèmes

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Description

The first part presents main principles of Model-Driven Engineering (MDE): metamodeling (EMF), static semantics (OCL), textual (Xtext) or graphical (Sirius) concrete syntaxes, model to text transformations (Acceleo), model to model transformations (EMF/Java and ATL). A running example is used to illustrate all these concepts and tools.

The second part deals with design patterns, reflection, annotations and test.

Person(s) in charge
CREGUT XAVIER

- Teaching Unit OPTIMISATION ET R.O.

Person(s) in charge
RUIZ DANIEL

Bibliography

F.S. Hillier, G.J. Liebermann Operations Research - Mc Graw Hill, Eighth Edition, 2005

Dominique de Werra, Thomas M. Liebling et Jean-François Heche. Recherche opérationnelle pour ingénieurs - Presses polytechniques et universitaires romandes. 2003.

- Subject Optimisation

Person(s) in charge
RUIZ DANIEL

- Subject Recherche Opérationnelle

Person(s) in charge
MARTHON PHILIPPE

- Semestre 7 SN FISE Parcours Systèmes Logiciels

Person(s) in charge
PANTEL MARC

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

- * Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.
- * Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.
- * Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

· **Subject Chinese**

· **Subject Italian**

· **Subject Japanese**

· **Subject Russian**

· **Subject German**

· **Subject French as a Foreign Language**

· **Subject Sports**

· **Subject Leadership & Management**

Person(s) in charge
HULL ALEXANDRA

· **Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS**

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013

* Fred B. Schneider : On Concurrent Programming, Springer, 1997

* George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair : Distributed Systems - Concepts and Design, Addison Wesley 2011

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données Réparties

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit THEORIE DES AUTOMATES ET DES LANGAGES, THEORIE DES GRAPHS

Objectives

The objective of the UE is twofold. The student must master the formalisms of finite automata, stack automata and Turing machine for the modeling of state based systems and the implementation of lexical and syntactic analyses. He is also introduced to the computability and complexity theories.

The student must also master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Person(s) in charge
MORIN GÉRALDINE

Bibliography

- Olivier Carton, Langages formels, calculabilité et complexité, Vuibert, 2008 (ISBN 978-2-7117-2077-4)
- Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013). Introduction to Automata Theory, Languages, and Computation(3rd ed.). Pearson. ISBN 1292039051.
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- * Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Subject Automates

Person(s) in charge
PANTEL MARC

- Subject Graphes

Pre-requisites

Programming skills in ocaml

Objectives

The student must master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Description

Chapter 1 : Definitions and basic concepts

Chapter 2 : Graph connexity

Chapter 3 : Euler and Hamilton graphs

Chapter 4 : Exploring graphs

Chapter 5 : Graph coloring and Planar graphs

Each chapter is studied in class and related exercices are proposed.

5 labs are dedicated to the project.

Number of hours

5 cours-TD, 5 TP

Person(s) in charge

MORIN GÉRALDINE

Bibliography

* Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Teaching Unit GENIE DU LOGICIEL ET DES SYSTEMES

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Person(s) in charge

CREGUT XAVIER

Bibliography

- Gamma, Erich; Richard Helm, Ralph Johnson, and John Vlissides (1995). Design Patterns : Elements of Reusable Object-Oriented Software. Addison-Wesley. ISBN 0-201-63361-2.
- Mark Grand. Patterns in Java: A Catalog of Reusable Design Patterns Illustrated with UML, volume 1. Wiley, 2 edition, 2002.
- Sommerville, Ian (2007) [1982]. Software Engineering (8th ed.). Harlow,England : Pearson Education. ISBN 0-321-31379-8
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- EMF: Eclipse Modeling Framework 2.0 2nd, David Steinberg, Frank Budinsky, Marcelo Paternostro, Ed Merks, Addison-Wesley Professional, 2009 ISBN : 0321331885.

- Subject Génie du Logiciel et des Systèmes

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Description

The first part presents main principles of Model-Driven Engineering (MDE): metamodeling (EMF), static semantics (OCL), textual (Xtext) or graphical (Sirius) concrete syntaxes, model to text transformations (Acceleo), model to model transformations (EMF/Java and ATL). A running example is used to illustrate all these concepts and tools.

The second part deals with design patterns, reflection, annotations and test.

Person(s) in charge

CREGUT XAVIER

- Teaching Unit OPTIMISATION ET R.O.

Person(s) in charge

RUIZ DANIEL

Bibliography

F.S. Hillier, G.J. Liebermann Operations Research - Mc Graw Hill, Eighth Edition, 2005

Dominique de Werra, Thomas M. Liebling et Jean-François Heche. Recherche opérationnelle pour ingénieurs - Presses polytechniques et universitaires romandes. 2003.

- Subject Optimisation

Person(s) in charge
RUIZ DANIEL

- Subject Recherche Opérationnelle

Person(s) in charge
MARTHON PHILIPPE

- Teaching Unit PROGRAMMATION FONCTIONNELLE

Objectives

The objective of the UE is to master the principles of algorithmic and side effect free functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. He can handle lists, tree-like data structures and their iterators, but also lazy structures such as streams. He can design and give structure to applications through the use of modules, functors and advanced typing schemes. The associated programming language is the OCaml language.

Person(s) in charge
THIRIOUX XAVIER

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailoux, Pascal Manoury, Bruno Pagano
- Purely Functional Data Structures, Chris Okasaki, 1999

- Subject Programmation Fonctionnelle

Description

Please refer to the UE syllabus, as this is the sole topic in the UE.

Person(s) in charge
THIRIOUX XAVIER

- Semestre 7 SN FISE Parcours Image et Multimédia

Person(s) in charge
CHARVILLAT VINCENT

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

- * Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.
- * Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.
- * Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject French as a Foreign Language

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit BASE DE LA PROGRAMMATION FONCT ET TRADUCTION DES LANGAGES

Objectives

The objective of the UE is twofold. The student must master the principles of algorithmic and without side effect programming using functional programming. In particular, he must master the concepts of recursion, complexity and termination of the algorithms. It must be able to handle lists and iterators, as well as modules and functors. The associated programming language is the OCaml language.

He must also master the different stages of language translation: lexical analysis, syntactic analysis and semantic analysis. In the particular case of compilation, he must know four phases of the semantic analysis: the resolution of the identifiers thanks to a table of symbols, the typing, the memory placement of the variables and the code generation. The student will create a compiler that will take a sub-part of C into input language, which will produce code for an abstract stack machine. The compiler will itself be written in OCaml.

Person(s) in charge
HURAUULT AURELIE

Bibliography

- OCaml from the very beginning, John Whittington, 2013
- Développement d'applications avec Objective Caml, Emmanuel Chailloux, Pascal Manoury, Bruno Pagano
- Purely Functional Data Structures, Chris Okasaki, 1999
- Compilers: Principles, Techniques, and Tools (dragon book), Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman., 2007

- Subject Programmation Fonctionnelle

Person(s) in charge

HURAUULT AURELIE

- Subject Traduction des Langages

Person(s) in charge
HURAUULT AURELIE

- Subject PF et TDL

Person(s) in charge
HURAUULT AURELIE

- Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013
- * Fred B. Schneider : On Concurrent Programming, Springer, 1997
- * George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair : Distributed Systems - Concepts and Design, Addison Wesley 2011

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données Réparties

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit THEORIE DES AUTOMATES ET DES LANGAGES, THEORIE DES GRAPHS

Objectives

The objective of the UE is twofold. The student must master the formalisms of finite automata, stack automata and Turing machine for the modeling of state based systems and the implementation of lexical and syntactic analyses. He is also introduced to the computability and complexity theories.

The student must also master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Person(s) in charge
MORIN GÉRALDINE

Bibliography

- Olivier Carton, Langages formels, calculabilité et complexité, Vuibert, 2008 (ISBN 978-2-7117-2077-4)
- Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013). Introduction to Automata Theory, Languages, and Computation(3rd ed.). Pearson. ISBN 1292039051.
- Ferdinand Wagner, Ruedi Schmuki, Thomas Wagner et Peter Wolstenholme, Modeling Software with Finite State Machines : A Practical Approach, Auerbach Publications, 2006, 392 p. (ISBN 9780849380860).
- * Gondran, Michel, and Michel Minoux. Graphs and algorithms. Wiley, 1984

- Subject Automates

Person(s) in charge
PANTEL MARC

- Subject Graphes

Pre-requisites

Programming skills in ocaml

Objectives

The student must master the principal concepts and results of Graph Theory and is able to apply them to real life problems and situations. He can implement and test classical algorithms of graph theory, such as Euler's circuit, Disjkstra's shortest path, Welsh-Powell's coloring, etc.

Description

Chapter 1 : Definitions and basic concepts

Chapter 2 : Graph connexity

Chapter 3 : Euler and Hamilton graphs

Chapter 4 : Exploring graphs

Chapter 5 : Graph coloring and Planar graphs

Each chapter is studied in class and related exercices are proposed.

5 labs are dedicated to the project.

Number of hours
5 cours-TD, 5 TP

Person(s) in charge
MORIN GÉRALDINE

Bibliography

- Teaching Unit GENIE DU LOGICIEL ET DES SYSTEMES

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Person(s) in charge
CREGUT XAVIER

Bibliography

- Gamma, Erich; Richard Helm, Ralph Johnson, and John Vlissides (1995). Design Patterns : Elements of Reusable Object-Oriented Software. Addison-Wesley. ISBN 0-201-63361-2.
- Mark Grand. Patterns in Java: A Catalog of Reusable Design Patterns Illustrated with UML, volume 1. Wiley, 2 edition, 2002.
- Sommerville, Ian (2007) [1982]. Software Engineering (8th ed.). Harlow, England : Pearson Education. ISBN 0-321-31379-8
- Model-Driven Software Development : Technology, Engineering, Management (Wiley Software Patterns Series) Thomas Stahl, Markus Voelter, ISBN0-470-02570-0.
- EMF: Eclipse Modeling Framework 2.0 2nd, David Steinberg, Frank Budinsky, Marcelo Paternostro, Ed Merks, Addison-Wesley Professional, 2009 ISBN : 0321331885.

- Subject Génie du Logiciel et des Systèmes

Objectives

Study of the main software engineering principles. Understand and implement design patterns and model driven engineering.

Description

The first part presents main principles of Model-Driven Engineering (MDE): metamodeling (EMF), static semantics (OCL), textual (Xtext) or graphical (Sirius) concrete syntaxes, model to text transformations (Acceleo), model to model transformations (EMF/Java and ATL). A running example is used to illustrate all these concepts and tools.

The second part deals with design patterns, reflection, annotations and test.

Person(s) in charge
CREGUT XAVIER

- Teaching Unit OPTIMISATION ET R.O.

Person(s) in charge
RUIZ DANIEL

Bibliography

F.S. Hillier, G.J. Liebermann Operations Research - Mc Graw Hill, Eighth Edition, 2005

Dominique de Werra, Thomas M. Liebling et Jean-François Heche. Recherche opérationnelle pour ingénieurs - Presses polytechniques et universitaires romandes. 2003.

- Subject Optimisation

Person(s) in charge
RUIZ DANIEL

- Subject Recherche Opérationnelle

Person(s) in charge
MARTHON PHILIPPE

- Semestre 7 SN FISE Parcours Réseaux

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

* Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.

* Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.

* Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject French as a Foreign Language

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit COMMUNICATIONS NUMERIQUES SUR CANAUX SELECTIFS

Pre-requisites

Bases on telecommunications

Objectives

To be able to define a more complete channel modelization, compared to the one studied during the first year teaching unit "Bases on Telecommunications".

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Equalization,
- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching unit presents the telecommunication network physical layer solutions allowing to communicate on time varying and frequency selective channels: equalization, OFDM and CDMA. These solutions are currently used in several telecommunication systems, such as, for example, 3G, 4G, WiFi, ADSL and Digital Terrestrial TV. They rely on channel models described in the first teaching module.

Number of hours

17 lectures, 2 sessions of exercises, 8 sessions of practical work

Person(s) in charge

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- John. G. Proakis, Masoud Salehi, « Digital Communications », McGraw-Hill Education, 5th edition (November 6, 2007)
- Sergio Benedetto, Ezio Biglieri, « Principles of digital transmission : with wireless applications », Published in 1999 in New York (N.Y.) by Kluwer Academic/Plenum publishers.
- Raymond Steele, Lajos Hanzo, « Mobile Radio Communications », 2nd Edition, July 1999, Wiley-IEEE Press.
- J. R. Barry, E. A. Lee, and D. G. Messerschmitt, « Digital Communication », 3rd ed., Boston, MA: Kluwer Academic Publishers, 2003.
- B.P. Lathi and Zhi Ding, « Modern Digital and Analog Communication », International 4th ed. New York ; Oxford : Oxford University Press - Oxford series in electrical and computer engineering, 2010.
- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition,» Springer, 2015.
- Henrik Schulze and Christian Lüders, «Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Subject Modélisation de Canal

Person(s) in charge

COULON MARTIAL

- Subject Egalisation de Canal

Objectives

The objective of this course is to present detection and estimation methods in the context of frequency selective channels. A particular attention will be given to linear and nonlinear equalization methods with both time-domain or frequency-domain implementation for single-carrier communication systems.

Targeted skills

- To understand the fundamentals of detection and estimation techniques for frequency-selective channel transmissions;
- To be able to derive the discrete baseband equivalent model of a digital communication schemes for a frequency-dispersive channel;
- To know the main methods for detection and equalization;
- To know how to implement a detector and/or equalizer;
- To know how to select the parameters of the different methods to manage the performance/complexity trade-off.

Description

This course presents the methods for detection and estimation over frequency selective channels. The following points will be addressed:

- Modeling frequency selective channels: equivalent discrete baseband channel models, Forney vs Ungerböeck observation model;
- Time domain linear equalization: ZF and MMSE criteria for non-constrained RII filter and RIF;
- Nonlinear equalization: maximum likelihood detection (trellis, Viterbi Algorithm); non-linear filter-based or block-based detection(DFE) ;
- Frequency domain linear equalization : block circular single-carrier waveform; frequency domain equalization (ZF, MMSE); spectral shaping (OFDM precoded SC-OFDM / DFT, EW-SC-OFDM);

The practical lab. sessions are dedicated to the implementation of the algorithms and models seen in this course.

Number of hours

7 courses, 2 Practice Lab courses

Person(s) in charge

POULLIAT CHARLY

Teaching method

En présence

Teaching language

French

Bibliography

- [1] B. P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 2009.
- [2] John Barry, Edward Lee, David Merserschnitt, Digital Communications, Kluwer Academic Publisher, Third edition.
- [3] Andreas F. Molisch, Wireless Communications, 2nd Edition, IEEE Press-Wiley, 2010.
- [4] Digital Communications, 4th edition, John G. Proakis, Mc Graw-Hill.
- [5] J. Choi, Adaptive and Iterative Signal Processing in Communications, Cambridge University Press, 2006.
- [6] Zhi Ding and Ye Li, Blind Equalization and Identification , Marcel Dekker, New York, 2001.

- Subject OFDM/CDMA

Pre-requisites

Bases on telecommunications

Objectives

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching introduces Orthogonal Frequency Division Multiplexing (OFDM) and Code Division Multiple Access (CDMA), two techniques allowing to transmit on a frequency selective channel and widely used in several communication standards (for 3G, 4G, WiFi, l'ADSL, DTTV...).

Number of hours

6 lectures, 4h of practical work

Person(s) in charge

THOMAS Nathalie
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Phone 2236

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition, Springer, 2015.
- Henrik Schulze and Christian Lüders, « Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Teaching Unit COMMUNICATION NUMERIQUES CODEES

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cycle codes
- be able to code and decode the proposed codes
- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the problematic of data compression
- be able to implement a mobile communications chain and evaluate its performance on MATLAB software

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)

-be able to model and analyze the communication chain obtained using MATLAB software

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver

Description

The first part of this unit is devoted to channel coding, and more specifically to the study of convolutional and cyclic codes.

This first part is followed by an introduction to digital receivers and data compression.

The last part of the EU is devoted to the sizing and implementation under MATLAB of a communications chain encoded on a frequency-selective channel.

Number of hours

64

Person(s) in charge

BOUCHERET Marie-laure
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Phone 2229

MAILHES Corinne
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Phone 2237

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

- « Digital communications », John Proakis, McGraw-Hill Higher Education
- « Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

- Subject Codage canal

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cyclic codes
- be able to encode and decode the proposed codes

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)

Description

This module is dedicated to channel coding, and more specifically to the study of convolutional and cyclic codes:

- convolutional codes: state diagram, Viterbi algorithm, punching

- cyclic codes: Galois body, binary BCH codes, Reed-Solomon codes
- concatenated codes

Person(s) in charge

BOUCHERET Marie-laure
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BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

« Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

- Subject Récepteurs**Pre-requisites**

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Targeted skills

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Description

This section is devoted to an introduction to digital receivers :

- need for time-frequency synchronization (+ phase in the Gaussian channel) and channel estimation
- block diagram of a satellite receiver
- channel estimation (single and multi-carrier)

Person(s) in charge

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BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

- Subject Source Coding

Pre-requisites

Probabilities. Matrix computation

Objectives

Understand what is source coding: lossless or lossy coding methods: lossless linked to information theory and lossy methods based on signal processing, with the 2 big families, predictive coding and transform coding.

Targeted skills

Be able to ask the good questions for source coding: with or without distortion? And with distortion, which family of methods?

Description

I. Introduction

II. Lossless coding : basis (information theory in short), Huffman coding, based-dictionary methods, arithmetic coding

III. Lossy coding: the importance of scalar quantization

IV. Lossy coding: predictive coding

V. Lossy coding: transform coding

Number of hours

3 CM de 1h45 + 2 TD de 1h45

Person(s) in charge

MAILHES Corinne
Corinne.Mailhes@enseeiht.fr
Phone 2237

MAILHES CORINNE

Teaching method

En présence

- Subject Projet

Pre-requisites

N7EN02 Digital communications on selective channels

N7EN03A Channel coding

Objectives

- be able to dimension a communication chain on a selective channel (fixed/mobile) according to specifications
- be able to implement this communication chain
- be able to evaluate its performance using MATLAB software

Targeted skills

- be able to design and analyze a communication chain on a selective channel using MATLAB software

Description

This module is dedicated to the dimensioning and implementation using MATLAB of a coded communication chain on a frequency-selective channel. The performance of the chain will also be evaluated.

Person(s) in charge
BOUCHERET MARIE LAURE

Teaching method
En présence

Teaching language
French

- Teaching Unit RESEAUX LOCAUX ET DE TELECOMMUNICATIONS

Description

This teaching unit is dedicated to Local Area Networks and Telecom Networks:

- in the context of Local Area Networks, we mainly focus on Ethernet architecture and its evolution. The second part is dedicated to bridging.

- in the context of Telecom Networks, we will present the different solutions for circuit and packet switching networks.

The main objectives of this course are to understand the principles, the architecture and the protocols of these networks.

Person(s) in charge
BEYLOT ANDRE LUC

Bibliography

Les Réseaux, Guy Pujolle, Eyrolles, Edition 2018

Réseaux Locaux et Internet, Laurent Toutain, Hermès

- Subject Réseaux Locaux

Person(s) in charge
PAILLASSA BEATRICE

- Subject Réseaux de Télécommunications

Person(s) in charge
BEYLOT ANDRE LUC

- Teaching Unit SYSTEMES CONCURRENTS ET COMMUNICANTS

Description

Presentation of basic concepts, principles and mechanisms in concurrent programming and middleware. More precisely:

- * modelling and design of parallel systems
- * reasoning and evaluation on concurrent programs
- * essential design and synchronization patterns
- * practice of coarse-grained concurrent programming
- * understanding and knowledge of distributed interaction models
- * design and programming of applications according to the distributed object model

Person(s) in charge
MAURAN PHILIPPE

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * M. Raynal Concurrent Programming : Algorithms, Principles, and Foundations, Springer 2013
- * Fred B. Schneider : On Concurrent Programming, Springer, 1997
- * George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair : Distributed Systems - Concepts and Design, Addison Wesley 2011

- Subject Systèmes Concurrents

Person(s) in charge
MAURAN PHILIPPE

- Subject Intergiciels

Objectives

Présentation des principes et technologies de base dans le domaine des intergiciels, permettant la construction d'application réparties

Description

- l'interface socket
- le modèle client-serveur et les outils d'appel à distance (RPC, RMI, web services)
- les intergiciels à messages (JMS)
- intégration d'applications : les ESB

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données Réparties

Pre-requisites

- concurrent systems
- middlewares

Objectives

- Put into practice the concepts presented in Middlewares and Concurrent Systems
- Manage a project in a group

Description

The project focuses on the creation of a platform to manage concurrent applications operating on shared data, in a centralized and then distributed environment.

It will consist in developing the platform itself, then evaluating it through the development of a panel of applications using this platform.

The requested platform includes, in a simplified way, the functionalities of standard software in the domain. For example, the latest editions of the project are based on the architecture of the Hadoop platform.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit INTERNET ET GRAPHES

Person(s) in charge
FASSON JULIEN

- Subject Internet

Person(s) in charge
CHAPUT EMMANUEL

- Subject Projet Interconnexion

Person(s) in charge
FASSON JULIEN

- Subject Théorie des graphes

Person(s) in charge
DHAOU RIADH

- Semestre 7 SN FISE Parcours Systèmes de Télécommunication

Person(s) in charge
POULLIAT CHARLY

- Teaching Unit SOFT AND HUMAN SKILLS 3

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.1 : Presentations

Pre-requisites

None.

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Deliver an effective scientific or technical presentation in English.
- 2) Develop your professional network; contact and interview an alumni (in English preferably).
- 3) Write a report of the alumni interview in English; prepare written documents in English (CV, letter, PowerPoint) for your Personal Professional Project (PPP).

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Teaching method

En présence

Teaching language

English

Bibliography

- * Gallo, C. (2014). *Talk Like TED: The 9 Public-speaking Secrets of the World's Top Minds*. St. Martin's Press.
- * Treu, J. (2014). *Social Wealth: How to Build Extraordinary Relationships By Transforming the Way We Live, Love, Lead and Network*. Be Extraordinary LLC.
- * Garner, B. A. (2013). *HBR Guide to Better Business Writing (HBR Guide Series)*. Harvard Business Review Press.

- 2nd language

Choice: 1 Among 1 :

- Subject Spanish

· **Subject Spanish**

· **Subject Chinese**

· **Subject Italian**

· **Subject Japanese**

· **Subject Russian**

· **Subject German**

· **Subject French as a Foreign Language**

· **Subject Sports**

· **Subject Leadership & Management**

Person(s) in charge
HULL ALEXANDRA

· **Teaching Unit IDM ET INTERGICIELS**

Person(s) in charge
OUEDERNI MERIEM

· **Subject Intergiciel dirigée par les modules**

Person(s) in charge
CREGUT XAVIER

· **Subject Intergiciels**

Person(s) in charge
OUEDERNI MERIEM

· **Subject Introduction aux Applications Web**

Person(s) in charge
HAGIMONT DANIEL

· **Teaching Unit COMMUNICATIONS NUMERIQUES SUR CANAUX SELECTIFS**

Pre-requisites

Bases on telecommunications

Objectives

To be able to define a more complete channel modelization, compared to the one studied during the first year teaching unit "Bases on Telecommunications".

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Equalization,
- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching unit presents the telecommunication network physical layer solutions allowing to communicate on time varying and frequency selective channels: equalization, OFDM and CDMA. These solutions are currently used in several telecommunication systems, such as, for example, 3G, 4G, WiFi, ADSL and Digital Terrestrial TV. They rely on channel models described in the first teaching module.

Number of hours

17 lectures, 2 sessions of exercises, 8 sessions of practical work

Person(s) in charge

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- John. G. Proakis, Masoud Salehi, « Digital Communications », McGraw-Hill Education, 5th edition (November 6, 2007)
- Sergio Benedetto, Ezio Biglieri, « Principles of digital transmission : with wireless applications », Published in 1999 in New York (N.Y.) by Kluwer Academic/Plenum publishers.
- Raymond Steele, Lajos Hanzo, « Mobile Radio Communications », 2nd Edition, July 1999, Wiley-IEEE Press.
- J. R. Barry, E. A. Lee, and D. G. Messerschmitt, « Digital Communication », 3rd ed., Boston, MA: Kluwer Academic Publishers, 2003.
- B.P. Lathi and Zhi Ding, « Modern Digital and Analog Communication », International 4th ed. New York ; Oxford : Oxford University Press - Oxford series in electrical and computer engineering, 2010.
- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition, Springer, 2015.
- Henrik Schulze and Christian Lüders, « Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Subject Modélisation de Canal

Person(s) in charge

COULON MARTIAL

- Subject Egalisation de Canal

Objectives

The objective of this course is to present detection and estimation methods in the context of frequency selective channels. A particular attention will be given to linear and nonlinear equalization methods with both time-domain or frequency-domain implementation for single-carrier communication systems.

Targeted skills

- To understand the fundamentals of detection and estimation techniques for frequency-selective channel transmissions;
- To be able to derive the discrete baseband equivalent model of a digital communication schemes for a frequency-dispersive channel;
- To know the main methods for detection and equalization;
- To know how to implement a detector and/or equalizer;
- To know how to select the parameters of the different methods to manage the performance/complexity trade-off.

Description

This course presents the methods for detection and estimation over frequency selective channels. The following points will be addressed:

- Modeling frequency selective channels: equivalent discrete baseband channel models, Forney vs Ungerböeck observation model;
- Time domain linear equalization: ZF and MMSE criteria for non-constrained RII filter and RIF;
- Nonlinear equalization: maximum likelihood detection (trellis, Viterbi Algorithm); non-linear filter-based or block-based detection(DFE) ;
- Frequency domain linear equalization : block circular single-carrier waveform; frequency domain equalization (ZF, MMSE); spectral shaping (OFDM precoded SC-OFDM / DFT, EW-SC-OFDM);

The practical lab. sessions are dedicated to the implementation of the algorithms and models seen in this course.

Number of hours

7 courses, 2 Practice Lab courses

Person(s) in charge

POULLIAT CHARLY

Teaching method

En présence

Teaching language

French

Bibliography

- [1] B. P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 2009.
- [2] John Barry, Edward Lee, David Merserschnitt, Digital Communications, Kluwer Academic Publisher, Third edition.
- [3] Andreas F. Molisch, Wireless Communications, 2nd Edition, IEEE Press-Wiley, 2010.
- [4] Digital Communications, 4th edition, John G. Proakis, Mc Graw-Hill.
- [5] J. Choi, Adaptive and Iterative Signal Processing in Communications, Cambridge University Press, 2006.
- [6] Zhi Ding and Ye Li, Blind Equalization and Identification , Marcel Dekker, New York, 2001.

- Subject OFDM/CDMA

Pre-requisites

Bases on telecommunications

Objectives

To be able to implement one of the following techniques to transmit through a time and frequency selective channel:

- Orthogonal Frequency Division Multiplexing (OFDM),
- Code Division Multiple Access (CDMA).

Description

This teaching introduces Orthogonal Frequency Division Multiplexing (OFDM) and Code Division Multiple Access (CDMA), two techniques allowing to transmit on a frequency selective channel and widely used in several communication standards (for 3G, 4G, WiFi, l'ADSL, DTTV...).

Number of hours

6 lectures, 4h of practical work

Person(s) in charge

THOMAS Nathalie
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Phone 2236

THOMAS NATHALIE

Teaching method

En présence

Teaching language

French

Bibliography

- Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, « Multi-Carrier Digital Communications: Theory and Applications of OFDM », 2nd ed. New York : Springer, 2004.
- Ramjee Prasad, « OFDM for wireless communications systems », Artech House, 2004.
- Charles E. Cook, Fred. W. Ellersick, Laurence B. Milstein, and Donald L. Shilling, « Spread Spectrum Communications », Eds. New York, NY: IEEE Press, 1983.
- Don Torrieri, « Principles of Spread-Spectrum Communication Systems », Third Edition, Springer, 2015.
- Henrik Schulze and Christian Lüders, « Theory and Applications of OFDM and CDMA: Wideband Wireless Communications », John Wiley, January 2006.

- Teaching Unit COMMUNICATION NUMERIQUES CODEES

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cycle codes

- be able to code and decode the proposed codes
- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the problematic of data compression
- be able to implement a mobile communications chain and evaluate its performance on MATLAB software

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)
- be able to model and analyze the communication chain obtained using MATLAB software
- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver

Description

The first part of this unit is devoted to channel coding, and more specifically to the study of convolutional and cyclic codes.

This first part is followed by an introduction to digital receivers and data compression.

The last part of the EU is devoted to the sizing and implementation under MATLAB of a communications chain encoded on a frequency-selective channel.

Number of hours

64

Person(s) in charge

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Phone 2229

MAILHES Corinne
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Phone 2237

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

- « Digital communications », John Proakis, McGraw-Hill Higher Education
- « Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

- Subject Codage canal

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- be able to dimension a channel coding scheme based on convolutional and cyclic codes
- be able to encode and decode the proposed codes

Targeted skills

- be able to define a coding scheme based on convolutional and cyclic codes for the physical layer of a telecommunications system (fixed/mobile, single/multi-carrier)

Description

This module is dedicated to channel coding, and more specifically to the study of convolutional and cyclic codes:

- convolutional codes: state diagram, Viterbi algorithm, punching
- cyclic codes: Galois body, binary BCH codes, Reed-Solomon codes
- concatenated codes

Person(s) in charge

BOUCHERET Marie-laure
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Phone 2229

BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

Bibliography

« Channel Codes: Classical and Modern », William Ryan et Shu Lin, Cambridge University Press

- Subject Récepteurs

Pre-requisites

Digital communications (UE N6EN02 "Telecommunications" or equivalent)

Objectives

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Targeted skills

- understand the issues of time-frequency-phase synchronization and channel estimation in a receiver
- understand the block diagram of a receiver

Description

This section is devoted to an introduction to digital receivers :

- need for time-frequency synchronization (+ phase in the Gaussian channel) and channel estimation
- block diagram of a satellite receiver
- channel estimation (single and multi-carrier)

Person(s) in charge

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BOUCHERET MARIE LAURE

Teaching method

En présence

Teaching language

French

- Subject Source Coding

Pre-requisites

Probabilities. Matrix computation

Objectives

Understand what is source coding: lossless or lossy coding methods: lossless linked to information theory and lossy methods based on signal processing, with the 2 big families, predictive coding and transform coding.

Targeted skills

Be able to ask the good questions for source coding: with or without distortion? And with distortion, which family of methods?

Description

I. Introduction

II. Lossless coding : basis (information theory in short), Huffman coding, based-dictionary methods, arithmetic coding

III. Lossy coding: the importance of scalar quantization

IV. Lossy coding: predictive coding

V. Lossy coding: transform coding

Number of hours

3 CM de 1h45 + 2 TD de 1h45

Person(s) in charge

MAILHES Corinne

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MAILHES CORINNE

Teaching method

En présence

- Subject Projet

Pre-requisites

N7EN02 Digital communications on selective channels

N7EN03A Channel coding

Objectives

- be able to dimension a communication chain on a selective channel (fixed/mobile) according to specifications

- be able to implement this communication chain

- be able to evaluate its performance using MATLAB software

Targeted skills

-be able to design and analyze a communication chain on a selective channel using MATLAB software

Description

This module is dedicated to the dimensioning and implementation using MATLAB of a coded communication chain on a frequency-selective channel. The performance of the chain will also be evaluated.

Person(s) in charge
BOUCHERET MARIE LAURE

Teaching method
En présence

Teaching language
French

- Teaching Unit RESEAUX LOCAUX ET DE TELECOMMUNICATIONS

Description

This teaching unit is dedicated to Local Area Networks and Telecom Networks:

- in the context of Local Area Networks, we mainly focus on Ethernet architecture and its evolution. The second part is dedicated to bridging.

- in the context of Telecom Networks, we will present the different solutions for circuit and packet switching networks.

The main objectives of this course are to understand the principles, the architecture and the protocols of these networks.

Person(s) in charge
BEYLOT ANDRE LUC

Bibliography

Les Réseaux, Guy Pujolle, Eyrolles, Edition 2018

Réseaux Locaux et Internet, Laurent Toutain, Hermès

- Subject Réseaux Locaux

Person(s) in charge
PAILLASSA BEATRICE

- Subject Réseaux de Télécommunications

Person(s) in charge
BEYLOT ANDRE LUC

- Teaching Unit INTERNET ET GRAPHERS

Person(s) in charge
FASSON JULIEN

- Subject Internet

Person(s) in charge
CHAPUT EMMANUEL

- Subject Projet Interconnexion

Person(s) in charge
FASSON JULIEN

- Subject Théorie des graphes

Person(s) in charge
DHAOU RIADH

- Semestre 7 à l'Etranger

Choice: 1 Among 1 :

- Teaching Unit Semestre d'Etudes à la TU-Darmstadt (Allemagne)

- Teaching Unit Semestre d'Etudes à l'Université de Hong Kong

- Teaching Unit Sem TU-Delft (Pays-Bas)

- Teaching Unit Semestre d'Etudes Queensland U.T. (Australie)

- Teaching Unit Semestre d'étude à l'université de LEUVEN-KU (Belgique)

- Teaching Unit Semestre d'étude à l'Univ.VAASA (Finlande)

- Teaching Unit Semestre d'études Université de Cordoba (Argentine)

- Teaching Unit Sem. d'études Polytechnic Inst, Ho Chi Minh Ville (Vietnam)

- Teaching Unit Semestre d'étude Pontifica Javeriana, Bogota (Colombie)

- Teaching Unit Semestre d'études Louvain (Univ. Cath) (Belgique)
- Teaching Unit Semestre d'Etudes INHA, Incheon, Corée du Sud
- Teaching Unit Semestre d'Etudes Universidad Nacional de Columbia (UNAL)
- Teaching Unit Semestre à l'Université d'Uppsala (Suède)
- Teaching Unit Sem. Univ.Libre Bruxelles
- Teaching Unit Semestre d'Etudes à l'Université de Lima (Pérou)
- Teaching Unit Semestre d'Etudes à l'Université de Karlsruhe (Allemagne)
- Teaching Unit Semestre d'Etude à l'Université de Hamburg (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Université de La Paz (Bolivie)
- Teaching Unit Semestre d'Etudes à Ecole Polytechnique de Montréal (Canada)
- Teaching Unit Semestre d'Etudes à l'Université de Stavanger (Norvège)
- Teaching Unit Semestre d'Etudes à l'Université de Trondheim (Norvège)
- Teaching Unit Semestre à la TU-Berlin (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Imperial College de Londres (GB)
- Teaching Unit Semestre d'Etudes à l'Univ. d'Auckland (Nouvelle-Zélande)
- Teaching Unit Semestre d'Etudes à l'Univ. de Birmingham (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. College Cork (Irlande)
- Teaching Unit Semestre d'Etudes à l'Univ. de Coventry (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. d' Edimbourg (UK)
- Teaching Unit Semestre d'Etudes à l'EPFL, Lausanne (Suisse)
- Teaching Unit Semestre d'Etudes à la Fac. Polytech. de Mons (Belgique)
- Teaching Unit Semestre d'Etudes à l'UFSC, Florianopolis (Brésil)

- Teaching Unit Semestre d'Etudes à Georgia Tech, Atlanta (USA)
- Teaching Unit Semestre d'Etudes à l'Univ. de Lund (Suède)
- Teaching Unit Semestre d'Etudes à la TU-Hambourg (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Madrid (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Mondragon (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Nottingham (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. de Recife (Brésil)
- Teaching Unit Semestre d'Etudes à l'Univ. de Saragosse (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Sydney (Australie)
- Teaching Unit Semestre d'Etudes à la TU-Brême
- Teaching Unit Semestre d'Etudes à la TU-Eindhoven (Pays-Bas)
- Teaching Unit Semestre d'Etudes à la TU-Münich (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Laval (Canada)
- Teaching Unit Semestre d'Etudes à l'Université de Bergen (Norvège)
- Teaching Unit Semestre d'Etudes à l'Univ. Complutense, Madrid (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Pavie (Italie)
- Teaching Unit Semestre d'Etudes à l'Univ. Montréal (Canada)
- Teaching Unit Semestre d'Etudes à l'Univ. de Valence (Espagne)
- Teaching Unit Semestre d'Etudes à Concordia, Canada
- Teaching Unit Semestre d'Etudes à California Davis Univ. , USA
- Teaching Unit Semestre ETH Zürich, Suisse
- Teaching Unit Semestre Université de Stockholm, Suède

- Teaching Unit Semestre d'Etudes à l'Univ. de Purdue (USA)
- Teaching Unit Semestre d'Etudes à l'Univ. de Rio UFRJ (Brésil)
- Teaching Unit Semestre d'Etudes à l'Université de Concepcion (Chili)
- Teaching Unit Semestre d'Etudes à l'Univ. de Dublin DCU (IRL)
- Teaching Unit Semestre d'Etudes à l'Univ. de Sherbrooke (CAN)
- Teaching Unit Semestre d'Etudes à l'Univ. de Barcelone UPC (ESP)
- Teaching Unit Semestre d'Etudes à l'Univ. de Shanghai JTU (Chine)
- Teaching Unit Semestre d'Etudes à l'Université de Séville (Espagne)
- Teaching Unit Semestre d'Etudes à l'Université de Palerme (Italie)
- Teaching Unit Semestre d'Etudes à l'Université de Klagenfurt (Autriche)
- Teaching Unit Semestre d'Etudes à l'Université de Pampelune (ESP)
- Teaching Unit Semestre d'Etudes à la DTU Copenhague
- Teaching Unit Semestre d'Etudes à l'Université d'Arequipa (Pérou)
- Teaching Unit Semestre d'Etudes à l'Université de Belfast (GB)
- Teaching Unit Semestre d'Etudes à l'ETSEIB Barcelone (Espagne)
- Teaching Unit Sem Université de Florence
- Teaching Unit Sem EHTP Casablanca (Maroc)
- Teaching Unit Sem Univ. Aachen
- Teaching Unit Sem Université Stuttgart
- Teaching Unit Semestre d'études à l'Université de Cranfield
- Teaching Unit Semestre d'études au Royal Holloway London
- Teaching Unit Sem Aalborg

- Teaching Unit Sem St Andrews
- Teaching Unit Semestre d'études au Polytec. Turin
- Teaching Unit Semestre d'Etudes à l'Université de Chalmers (Suède)
- Teaching Unit Semestre d'Etudes à l'Univ. de Cracovie
- Teaching Unit Semestre d'Etudes à la Wrije Univ. Bruxelles
- Teaching Unit Semestre d'Etudes à l'Univ. de Guadalajara (Mexique)
- Teaching Unit Semestre d'Etudes à l'Univ. de Chengdu (Chine)
- Teaching Unit Semestre d'Etudes à l'Univ. de Bahia Blanca (Argentine)
- Teaching Unit Semestre d'Etudes Erasmus Mundus IMETE
- Teaching Unit Semestre d'Etudes Univ. d'Oxford
- Teaching Unit Semestre d'études Université de Tomsk, Russie
- Teaching Unit Semestre d'études Université de Buenos Aires
- Teaching Unit Semestre d'études UPB Bucarest
- Teaching Unit Semestre d'Etudes à l'Université de Sonara (Mexique)
- Teaching Unit Sem Université Wuhan HUST, Chine
- Teaching Unit Sem Université Delhi DTU
- Teaching Unit Sem Université de Gdansk, Pologne
- Teaching Unit Sem USTH, Hanoï
- Teaching Unit Sem Univ. Rome Tor Vergata
- Teaching Unit Sem Université Nationale Taiwan
- Teaching Unit Sem ETS Montréal
- Teaching Unit Sem Université Varsovie

· Teaching Unit Semestre d'Etudes à Narvik University College (Norvège)

· Teaching Unit Semestre d'Etudes à l'Université de Twente (Pays-Bas)

· Teaching Unit Semestre d'études à l'univ. du Pays Basque Bilbao (ESP)

· Teaching Unit Sem Technicka Univerzita v Liberci, Liberec, Rép. Tchèque

· Teaching Unit Semestre d'Etudes à l'Université de Manchester

· Teaching Unit Semestre d'Etudes Université de Chicoutimi, Canada

· Teaching Unit Semestre d'Etude à l'Univ. Valparaiso, Chili

· Teaching Unit Semestre d'Etudes Séoul National University

· Teaching Unit Sem Firenze-UDSDF-Italie

· Teaching Unit Sem Constance (Allemagne)

· Teaching Unit Semestre à Bologne (Italie)

· Teaching Unit Semestre d'Etudes à l'Université d'Amsterdam

· Semestre 7 - Hors N7 en France

Choice: 1 Among 1 :

· Teaching Unit Semestre d'étude à l'ESC Toulouse

· Teaching Unit Semestre IAE Toulouse

· Teaching Unit Semestre ESC Rouen

· Teaching Unit Semestre EMLyon

· Teaching Unit Semestre d'Etudes à l'ISAE

· Teaching Unit Semestre d'Etudes à l'ENSIMAG

· Teaching Unit Semestre d'étude à Paris 6 Jussieu

· Teaching Unit Semestre Université Paris-Dauphine

· Teaching Unit Semestre d'études à Télécom Management

· Teaching Unit Semestre d'Etudes à Centrale Nantes

· Teaching Unit Semestre d'Etudes à l'Ecole Navale, Brest

· Teaching Unit Semestre d'études à Sciences Po Paris

· Teaching Unit Semestre d'études à Télécom Sud Paris

· Teaching Unit Semestre d'étude à Eurecom

· Teaching Unit Semestre d'études Toulouse Business School

· Teaching Unit Semestre Supélec

· Teaching Unit Semestre IFP

· Teaching Unit Semestre d'études à l'Université de Montpellier

· Teaching Unit Semestre d'études à l'ESSEC

· Teaching Unit Semestre ENAC

· Teaching Unit Semestre IAE Paris

· Teaching Unit Semestre IAE Lyon

· Teaching Unit Semestre d'études à l'ENSPM

· Teaching Unit Semestre à l'Ecole Polytechnique, Palaiseau

· Teaching Unit Semestre d'Etudes à l'ENSAE

· Teaching Unit Université Paris-Saclay

· Teaching Unit Semestre d'études à l'ENM

· Teaching Unit Semestre d'études à l'ENSE3

· Teaching Unit Semestre d'études à l'ENSTA

· Teaching Unit Semestre d'études à HEC Paris

- Teaching Unit Semestre A7 Génie des Systèmes Industriels

- Teaching Unit Semestre INSTN

- Choix de Parcours Semestre 8-2A-SN-FISE

Choice: 1 Among 1 :

- Semestre 8 - CESURE

- Semestre 8 SN FISE Parcours Architecture Système et Réseaux

Person(s) in charge
JAKLLARI GENTIAN

- Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.2 : Debates

Pre-requisites

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write an reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Person(s) in charge

LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language

Person(s) in charge
BLANCO ANDRE

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject french (as a foreign language)

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit APPLICATIONS CONCURRENTES ET COMMUNICANTES, BASE DE DONNES

Description

Putting into practice and context knowledge in concurrent programming, middleware and databases. More precisely:

- * practice and pattern design of fine-grained concurrent programming
- * dynamic web application design
- * distributed application design

* knowledge of data models

* data modelling theory and practice

Person(s) in charge

HAGIMONT DANIEL

Bibliography

* Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012

* Antonio Goncalves, Beginning Java EE 7, Apress, 2013

* Toby J. Teorey,# Sam S. Lightstone,# Tom Nadeau,# H.V. Jagadish, Database Modeling and Design, 5th edition, Morgan Kaufmann, 2011

- Subject Open MP

- Subject Application Web

Objectives

Présentation des principes et technologies de base dans le domaine des applications web, permettant la construction de sites web dynamiques

Description

- les formats et protocoles du web
- les pages web dynamiques (servlets, JSP)
- les Enterprise Java Bean (EJB, MVC)
- les couches de persistance (JDBC, JPA)
- les frameworks JavaScript (Angular, JQuery)

Person(s) in charge

HAGIMONT DANIEL

- Subject Base de données

Person(s) in charge

OSTERMANN PASCAL

- Subject Projet Application Web

Objectives

Le but est de mettre en pratique les principes et technologies vus en cours pour concevoir un site web dynamique (commerce électronique)

Description

- conception d'un site complet
- travail en groupe
- découverte de nouvelles technologie au auto-apprentissage

Person(s) in charge

HAGIMONT DANIEL

- Subject Projet Données réparties

Objectives

Mettre en pratique les principes et technologies présentées en Intergiciels et Systèmes Concurrents

Description

Le projet est centré sur la réalisation d'une plateforme permettant de gérer des applications concurrentes opérant sur des données partagées, dans un environnement centralisé, puis réparti.

Il s'agira de développer la plateforme proprement dite, puis de l'évaluer à travers le développement d'un panel d'applications utilisant cette plateforme.

La plateforme demandée reprend, de manière simplifiée, les fonctionnalités de logiciels standard du domaine. Par exemple, les dernières éditions du projet reprennent l'architecture de la plateforme Hadoop.

Ce projet est la suite de celui menée au semestre précédent dans l'UE Systèmes Concurrents et Communicants.

Person(s) in charge

MAURAN PHILIPPE

- Teaching Unit SCIENCES ET INGENIERIE DES RESEAUX

Objectives

The purpose of this unit is threefold, addressing the theoretical and practical aspects of network performance, quality of service and the analysis of complex networks.

The goal is, first, to learn to analyze and evaluate the performance of computer systems from stochastic models. We will first study the Markov decision process, which is a general framework for optimizing stochastic models, and in particular Markov chains. We will then study the performance of the most important scheduling policies in practice. We will finish by studying the allocation of resources in networks, with particular attention to TCP

Then we will learn how to analyze complex and dynamic networks and model them using random graphs. Master the notions of small worlds, preferential attachment, temporal graphs. The problems of network analysis are applied to social networks, dynamic network analysis, link analysis, robustness analysis, pandemic analysis (infection times, recovery times, ...), web links analysis (page ranking, ...), measures of centrality, ...

Master spectral analysis tools for complex networks, measurement tools, analysis of dissemination phenomena, communities, ... and interdependence between networks (degrees of correlation, ...).

Person(s) in charge

DHAOU RIADH

Bibliography

- Srikant, R. and Ying, Lei, Communication Networks: An Optimization, Control and Stochastic Networks Perspective, Cambridge University Press (2014)

- M. Harchol-Balter, Performance Modeling and Design of Computer Systems: Queueing Theory in Action, Cambridge University Press, 2013

- S. Ross, Introduction to stochastic dynamic programming, Academic Press, 1983

- Network Science, de Albert-László Barabási, Mars 2016

- Subject Qualité de service

Person(s) in charge
CHAPUT EMMANUEL

- Subject Contrôle et Apprentissage

Person(s) in charge
AYESTA MORATE URTZI

- Subject Science de Réseaux

Person(s) in charge
DHAOU RIADH

- Subject Projet Ingénierie de Réseaux

Person(s) in charge
DHAOU RIADH

- Teaching Unit ARCHITECTURE DES SYSTEMES D'EXPLOITATION

Objectives

The goal of this UE is to understand the principles for designing operating systems, such as kernel, hardware accesses, hardware protection, drivers, ...

Example of the Linux system is used.

An operating system will be design for a processor implemented unboard a FPGA.

The project aims to define an hardware driver which will control an Ethernet card.

Person(s) in charge
ERMONT JEROME

Bibliography

- Linux Device Drivers, 3rd Edition, O'Reilly
- Understanding the Linux Kernel, 3rd Edition, From I/O Ports to Process Management, O'Reilly
- Professional Linux Kernel Architecture, Wrox

- Subject Architecture des Systèmes d'Exploitation

Person(s) in charge
ERMONT JEROME

- Teaching Unit INTERCONNEXION ET MODELISATION DES RESEAUX

Person(s) in charge
DHAOU RIADH

- Subject Evaluation de Perfomance

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Simulation de Réseaux

Person(s) in charge
DHAOU RIADH

- Subject Interconnexion

Person(s) in charge
BEYLOT ANDRE LUC

- Teaching Unit SYSTEMES DE TELECOM SANS FIL ET MOBILES 3

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Réseaux Mobiles

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Réseaux Sans-Fil

Pre-requisites

A good understanding of the TPC/IP. Some basic notions of the wireless physical layer.

Objectives

An in-depth understanding of the key challenges involved in designing protocols for wireless networks. A good understanding of the architectural differences between different wireless technologies.

Targeted skills

Be capable of designing and implementing a wireless network based on a set of requirements stemming from particular user and application needs.

Description

This course presents the main challenges related to the design and implementation of wireless networks and how they are addressed in some of the major technologies in the market, in particular WiFi and Bluetooth.

Person(s) in charge

JAKLLARI GENTIAN

Teaching method

En présence

Teaching language

English

Bibliography

[1] Computer Networking: A Top-Down Approach (7th Edition), by James Kurose, Keith Ross

[2] Mobile Communications (2nd Edition) by Jochen Schiller

- Subject Couches Physique**Person(s) in charge**

ESCRIG BENOIT

- Subject Sécurité**Person(s) in charge**

MORGAN BENOIT

- Semestre 8 SN FISE Parcours HPC et Big Data**Person(s) in charge**

GRATTON SERGE

- Teaching Unit Soft and Human Skills**Person(s) in charge**

HULL ALEXANDRA

- Subject Professional English 2.2 : Debates**Pre-requisites**

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write an reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Person(s) in charge

LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language

Person(s) in charge

BLANCO ANDRE

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject french (as a foreign language)

- Subject Sports

- Subject Leadership & Management

Person(s) in charge

HULL ALEXANDRA

- Teaching Unit APPLICATIONS CONCURRENTES ET COMMUNICANTES, BASE DE DONNES

Description

Putting into practice and context knowledge in concurrent programming, middleware and databases. More precisely:

- * practice and pattern design of fine-grained concurrent programming
- * dynamic web application design
- * distributed application design
- * knowledge of data models
- * data modelling theory and practice

Person(s) in charge

HAGIMONT DANIEL

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * Antonio Goncalves, Beginning Java EE 7, Apress, 2013
- * Toby J. Teorey,# Sam S. Lightstone,# Tom Nadeau,# H.V. Jagadish, Database Modeling and Design, 5th edition, Morgan Kaufmann, 2011

- Subject Open MP

- Subject Application Web

Objectives

Présentation des principes et technologies de base dans le domaine des applications web, permettant la construction de sites web dynamiques

Description

- les formats et protocoles du web
- les pages web dynamiques (servlets, JSP)
- les Enterprise Java Bean (EJB, MVC)
- les couches de persistance (JDBC, JPA)
- les frameworks JavaScript (Angular, JQuery)

Person(s) in charge

HAGIMONT DANIEL

- Subject Base de données

Person(s) in charge

OSTERMANN PASCAL

- Subject Projet Application Web

Objectives

Le but est de mettre en pratique les principes et technologies vus en cours pour concevoir un site web dynamique (commerce électronique)

Description

- conception d'un site complet
- travail en groupe
- découverte de nouvelles technologie au auto-apprentissage

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données réparties

Objectives

Mettre en pratique les principes et technologies présentées en Intergiciels et Systèmes Concurrents

Description

Le projet est centré sur la réalisation d'une plateforme permettant de gérer des applications concurrentes opérant sur des données partagées, dans un environnement centralisé, puis réparti.

Il s'agira de développer la plateforme proprement dite, puis de l'évaluer à travers le développement d'un panel d'applications utilisant cette plateforme.

La plateforme demandée reprend, de manière simplifiée, les fonctionnalités de logiciels standard du domaine. Par exemple, les dernières éditions du projet reprennent l'architecture de la plateforme Hadoop.

Ce projet est la suite de celui menée au semestre précédent dans l'UE Systèmes Concurrents et Communicants.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit ALGEBRE LINEAIRE AVANCEE

Objectives

Knowledge of numerical methods that are efficient for the solution of large sparse linear systems of equations.

Understand the link between linear algebra and graph processing. Analyse the efficiency of a method with respect to complexity, computing time and memory footprint in the perspective of high performance computing.

Sparse linear algebra will be introduced and used to illustrate all these issues.

Know how to apply specific numerical methods to process matrices occurring in the area of data mining (i.e. non-negative factorization of matrices, partial linear least-square, graph partitioning, K-means clustering, multilinear algebra and tensors).

Person(s) in charge
AMESTOY PATRICK

Bibliography

1/ J. Dongarra, I. Duff, D. Sorensen and H. van der Vorst, Solving Linear Systems on Vector and Shared Memory Computers, SIAM, 1991.

2/ I. Duff, A. Erisman and J.K. Reid. Direct Methods for Sparse Matrices, Second Edition, Oxford University Press, London, 2017.

3/ E. Estrada, M. Fox, G.-L. Oppo and D. J. Higham, Network Science: Complexity in Nature and Technology, Springer, 2010.

- Subject Algèbre Linéaire creuse

Person(s) in charge
AMESTOY PATRICK

- Subject Algèbre Linéaire pour le Data

Person(s) in charge
RUIZ DANIEL

- Subject Prjjet Simulation Numérique

- Teaching Unit CONTROLE ET ANALYSE MULTIRESOLUTION

Person(s) in charge
COTS OLIVIER

- Subject Analyse hilbertienne pour le traitement des données

Objectives

Hilbert spaces are instrumental for solving problems whose unknown is a function. They are used for solving PDE's when the spectral method is concerned. They provide also a powerful framework for Fourier and Wavelet decomposition. Finally separations results are essential for many convex machine-learning algorithms. The goal of the course is to provide a rigorous exposition of these concepts, and to illustrate them on practical examples from PDE's and signal processing.

In a second part, we are interested in the numerical resolution of optimal control problems with ordinary differential equations. Such problems arise in many applications: orbital transfer, medical imaging... The goal is to solve efficiently the large scale optimization problem obtained via the discretization of the optimal control problem.

Person(s) in charge
GRATTON SERGE

Bibliography

Une exploration des signaux en ondelettes, S. Mallat, Les Editions de l'Ecole Polytechnique, 2000

Analyse réelle et complexe : Cours et exercices, W. Rudin

Dérivation, intégration, édition revue et augmentée, C. Wagschal, Hermann éditeurs, 2012

Analyse numérique et équations différentielles, J.-P. Demailly, Presses Universitaires de Grenoble, 1996

Contrôle optimal : théorie & applications, E. Trélat, Vuibert, Collection "Ma- thématiques Concrètes", 2005

- Subject Contrôle Optimal

Pre-requisites

Optimisation en dimension finie

Intégration

Objectives

We are interested in the numerical resolution of optimal control problems in the ordinary differential equations. An optimal control problem is an optimisation problem in infinite dimension whose unknown (the control) is a function of time. Such problems are coming from many applications: orbital transfer, medical imaging... The goal is to solve efficiently these problems via indirect shooting methods.

Description

- Mathematical formulation and examples of optimal control problems
- Necessary conditions of optimality
- Presentation of the numerical solver: the indirect shooting method
- Application to the orbital transfer problem minimising the energy

Complements will be given:

- in differential calculus in Banach spaces
- in the theory of ordinary differential equations

The practical work will be done in the Julia language (similar to Matlab but free) with a quick presentation. The student:

- will implement Runge-Kutta schemes for numerical integration
- will implement an indirect shooting method
- will see the importance of the calculation of derivatives (by finite differences, variational equations, automatic differentiation) in order to improve the convergence of the shooting method

Number of hours

26

Person(s) in charge

COTS OLIVIER

Teaching method

En présence

Teaching language

French

Bibliography

- Dérivation, intégration, édition revue et augmentée, C.Wagschal, Hermann éditeurs, 2012
- Analyse numérique et équations différentielles, J.-P. Demailly, Presses Universitaires de Grenoble, 1996

- Teaching Unit APPROXIMATION, INTERPOLATION, EDP

Description

The student knows interpolation and approximation models to fit data of first or second order. He also uses these polynomial or piecewise polynomial representations for modeling parametric curves and surfaces in the context of geometric modeling.

The student knows the finite element discretisation technique for solving partial differential equations. He is able to evaluate gradients of functional using adjoint computations. He also implements these techniques on a computer and is able to evaluate the quality of his solutions in terms of accuracy and performance.

Person(s) in charge

MORIN WEIMER GERALDINE

Bibliography

A practical guide to splines, C. de BOOR, 2001.

Curves and Surfaces for CAGD : A practical guide G. FARIN, 2001. (il existe une traduction en français)

A dynamic programming approach to curves and surfaces for geometric modeling, Ron Goldman, 2002

Subdivision for geometric design: A constructive approach, Warren, Weimer, 2001

- Subject Interpolation et Approximation

Objectives

Learn and practice the classical parametric models that are the basis on 3D modeling within CAD (Computer Aided Design) systems.

Targeted skills

The student knows interpolation and approximation models to fit data of first or second order. He also uses these polynomial or piecewise polynomial representations for modeling parametric curves and surfaces in the context of geometric modeling.

Number of hours

7 CTD, 8 TP (1 projet)

Person(s) in charge

MORIN WEIMER GERALDINE

Teaching method

En présence

Teaching language

Français

Bibliography

A practical guide to splines, C. de BOOR, 2001.

Curves and Surfaces for CAGD : A practical guide G. FARIN, 2001. (il existe une traduction en français)

A dynamic programming approach to curves and surfaces for geometric modeling, Ron Goldman, 2002

Subdivision for geometric design: A constructive approach, Warren, Weimer, 2001

- Subject E.D.P.

Pre-requisites

Lebesgue integral, linear algebra, optimisation

Objectives

The student knows the finite element discretisation technique for solving partial differential equations. He is able to evaluate gradients of functional using adjoint computations. He also implements these techniques on a computer and is able to evaluate the quality of his solutions in terms of accuracy and performance.

Person(s) in charge
GRATTON SERGE

- Teaching Unit APPRENTISSAGE MACHINE ET OPTIMISATION

Description

Optimisation 2:

Machine learning application often lead to optimisation problems of a composite nature: a typical fit-to-data term is penalized so as to enforce some geometrical properties in the solution. Typical properties include sparsity, low rank in matrices. Such problems are often non-differentiable but convex. We review the most popular sub-gradient based methods for solving such problems, insisting on the convergence properties and the complexity of such methods. We will also focus on efficient implementation of such methods on image processing applications. Finally, we will develop in the SPARK software a movie recommendation system.

Statistique 2:

In this course, the basic regression model is introduced along with its applications and extensions (generalized linear models especially logistic regression). Linear models provide an indispensable basis for later approaches to more modern methods used in big data.

Algorithms will be used in practical works with R to automatically select predictors and a procedure to evaluate the models will be detailed.

Person(s) in charge
GRATTON SERGE

Bibliography

First order methods in optimization, Amir Beck, SIAM

Convex Optimization: Algorithms and Complexity, Sebastian Bubeck

Régression avec R, Cornillon & Matzner-Lober, Springer

An R companion to applied regression, Fox & Weisberg, Sage

- Subject Optimisation 2

Pre-requisites

Basic course on linear algebra, Basic algorithms for unconstrained optimisation

Objectives

Machine learning application often lead to optimisation problems of a composite nature: a typical fit-to-data term is penalized so as to enforce some geometrical properties in the solution. Typical properties include sparsity, low rank in matrices. Such problems are often non-differentiable but convex. We review the most popular sub-gradient based methods for solving such problems, insisting on the convergence properties and the complexity of such methods. We will also focus on efficient implementation of such methods on image processing applications. Finally, we will develop in the SPARK software a movie recommendation system.

Person(s) in charge
GRATTON SERGE

- Subject Statistique 2

Objectives

In this course, the basic regression model is introduced along with its applications and extensions (generalized linear models especially logistic regression). Linear models provide an indispensable basis for later approaches to more modern methods used in big data. Algorithms will be used in practical works with R to automatically select predictors and a procedure to evaluate the models will be detailed.

Bibliography

Régression avec R, Cornillon & Matzner-Lober, Springer

An R companion to applied regression, Fox & Weisberg, Sage

- Semestre 8 SN FISE Parcours Systèmes Logiciels

Person(s) in charge
PANTEL MARC

- Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.2 : Debates

Pre-requisites

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write an reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Person(s) in charge

LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language

Person(s) in charge

BLANCO ANDRE

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject french (as a foreign language)

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit APPLICATIONS CONCURRENTES ET COMMUNICANTES, BASE DE DONNES

Description

Putting into practice and context knowledge in concurrent programming, middleware and databases. More precisely:

- * practice and pattern design of fine-grained concurrent programming
- * dynamic web application design
- * distributed application design
- * knowledge of data models
- * data modelling theory and practice

Person(s) in charge
HAGIMONT DANIEL

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * Antonio Goncalves, Beginning Java EE 7, Apress, 2013
- * Toby J. Teorey,# Sam S. Lightstone,# Tom Nadeau,# H.V. Jagadish, Database Modeling and Design, 5th edition, Morgan Kaufmann, 2011

- Subject Open MP

- Subject Application Web

Objectives

Présentation des principes et technologies de base dans le domaine des applications web, permettant la construction de sites web dynamiques

Description

- les formats et protocoles du web
- les pages web dynamiques (servlets, JSP)
- les Enterprise Java Bean (EJB, MVC)
- les couches de persistance (JDBC, JPA)
- les frameworks JavaScript (Angular, JQuery)

Person(s) in charge
HAGIMONT DANIEL

- Subject Base de données

Person(s) in charge
OSTERMANN PASCAL

- Subject Projet Application Web

Objectives

Le but est de mettre en pratique les principes et technologies vus en cours pour concevoir un site web dynamique (commerce électronique)

Description

- conception d'un site complet
- travail en groupe
- découverte de nouvelles technologie au auto-apprentissage

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données réparties

Objectives

Mettre en pratique les principes et technologies présentées en Intergiciels et Systèmes Concurrents

Description

Le projet est centré sur la réalisation d'une plateforme permettant de gérer des applications concurrentes opérant sur des données partagées, dans un environnement centralisé, puis réparti.

Il s'agira de développer la plateforme proprement dite, puis de l'évaluer à travers le développement d'un panel d'applications utilisant cette plateforme.

La plateforme demandée reprend, de manière simplifiée, les fonctionnalités de logiciels standard du domaine. Par exemple, les dernières éditions du projet reprennent l'architecture de la plateforme Hadoop.

Ce projet est la suite de celui menée au semestre précédent dans l'UE Systèmes Concurrents et Communicants.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit METHODES FORMELLES 1

Description

The first part deals with the modeling, the specification and the

verification of systems, especially concurrent systems. Transition systems are used as a basis for modeling. The linear and arborescent temporal logics LTL et CTL are used to specify safety, liveness and fairness properties. The second part deals with the study of technics and tools for the static and dynamic analysis of programs: deductive approach, model checking, abstract interpretation, test generation, safety analysis.

Person(s) in charge
QUEINNEC PHILIPPE

Bibliography

Specifying Systems (Leslie Lamport - Addison-Wesley)

The Temporal Logic of Reactive and Concurrent Systems (Zohar Manna et Amir Pnueli - Springer Verlag)

Principles of Program Analysis (Flemming Nielson and Hanne R. Nielson - Springer)

- Subject Systèmes de transition

Person(s) in charge
QUEINNEC PHILIPPE

- Subject Vérification par Analyse Statique

Person(s) in charge
THIRIOUX XAVIER

- Teaching Unit PARADIGMES EMERGENTS DE PROGRAMMATION

Objectives

Students know, understand and apply advanced concepts of programming

languages (aspects, annotations, mixins, traits, framework, meta-programming, reflection...).

Theory of computability and computational complexity.

Person(s) in charge
CREGUT XAVIER

- Subject Programmation Déclarative

Person(s) in charge
PANTEL MARC

- Subject Programmation Avancée et Calculabilité

Person(s) in charge
QUEINNEC PHILIPPE

- Teaching Unit SEMANTIQUE ET TRADUCTION DES LANGAGES

Person(s) in charge
PANTEL MARC

- Subject Sémantique et Traduction des langages

Person(s) in charge
PANTEL MARC

- Teaching Unit PROGRAMMATION MOBILE ET APPRENTISSAGE PROFOND

Person(s) in charge
CARLIER AXEL

- Subject Programmation Mobile

Description

This course offers an introduction to Android programming on mobile device with a particular focus on multimedia applications.

In the first part of the course a general overview of the framework and the inner architecture is presented.

Emphasis is placed on the life-cycle of applications, the Android task paradigm, the intent-based communication among applications and the graphical interfaces.

In the second part the course focus on the multimedia aspects of the Android programming with particular attention to the efficient processing of the video stream of the camera.

The course presents two common solutions that enable real-time processing of a large amount of data such as images and video stream: JNI native programming, which take advantage of native code to speed up data-intensive computations, and Renderscript, which offers a high-level API for acceleration that exploits heterogeneous hardware (CPU-GPU).

In the practical part of the course, students get familiar with the general Android frameworks and the different tools required to develop an application (Android Studio, Android Emulator etc) and develop applications to manage video streams and process the camera stream.

Person(s) in charge
GASPARINI SIMONE

Bibliography

- Liang, Sheng (1999). The Java Native Interface: Programmer's Guide and Specification, Addison-Wesley Professional
- Marchetti, Alberto (2016). RenderScript: parallel computing on Android, the easy way

- Subject Apprentissage Profond

Person(s) in charge
CARLIER AXEL

- Semestre 8 SN FISE Parcours Image et Multimédia

Person(s) in charge
CHARVILLAT VINCENT

- Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.2 : Debates

Pre-requisites

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write an reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Person(s) in charge

LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language

Person(s) in charge
BLANCO ANDRE

Choice: 1 Among 1 :

- Subject Spanish

• **Subject Spanish**

• **Subject Chinese**

• **Subject Italian**

• **Subject Japanese**

• **Subject Russian**

• **Subject German**

• **Subject french (as a foreign language)**

• **Subject Sports**

• **Subject Leadership & Management**

Person(s) in charge
HULL ALEXANDRA

• **Teaching Unit APPLICATIONS CONCURRENTES ET COMMUNICANTES, BASE DE DONNES**

Description

Putting into practice and context knowledge in concurrent programming, middleware and databases. More precisely:

- * practice and pattern design of fine-grained concurrent programming
- * dynamic web application design
- * distributed application design
- * knowledge of data models
- * data modelling theory and practice

Person(s) in charge
HAGIMONT DANIEL

Bibliography

- * Maurice Herlihy and Nir Shavit : The Art of Multiprocessor Programming, Morgan Kaufmann, 2012
- * Antonio Goncalves, Beginning Java EE 7, Apress, 2013
- * Toby J. Teorey,# Sam S. Lightstone,# Tom Nadeau,# H.V. Jagadish, Database Modeling and Design, 5th edition, Morgan Kaufmann, 2011

- Subject Open MP

- Subject Application Web

Objectives

Présentation des principes et technologies de base dans le domaine des applications web, permettant la construction de sites web dynamiques

Description

- les formats et protocoles du web
- les pages web dynamiques (servlets, JSP)
- les Enterprise Java Bean (EJB, MVC)
- les couches de persistance (JDBC, JPA)
- les frameworks JavaScript (Angular, JQuery)

Person(s) in charge
HAGIMONT DANIEL

- Subject Base de données

Person(s) in charge
OSTERMANN PASCAL

- Subject Projet Application Web

Objectives

Le but est de mettre en pratique les principes et technologies vus en cours pour concevoir un site web dynamique (commerce électronique)

Description

- conception d'un site complet
- travail en groupe
- découverte de nouvelles technologie au auto-apprentissage

Person(s) in charge
HAGIMONT DANIEL

- Subject Projet Données réparties

Objectives

Mettre en pratique les principes et technologies présentées en Intergiciels et Systèmes Concurrents

Description

Le projet est centré sur la réalisation d'une plateforme permettant de gérer des applications concurrentes opérant sur des données partagées, dans un environnement centralisé, puis réparti.

Il s'agira de développer la plateforme proprement dite, puis de l'évaluer à travers le développement d'un panel d'applications utilisant cette plateforme.

La plateforme demandée reprend, de manière simplifiée, les fonctionnalités de logiciels standard du domaine. Par exemple, les dernières éditions du projet reprennent l'architecture de la plateforme Hadoop.

Ce projet est la suite de celui menée au semestre précédent dans l'UE Systèmes Concurrents et Communicants.

Person(s) in charge
MAURAN PHILIPPE

- Teaching Unit TRAITEMENT DES DONNES AUDIO-VISUELLES

Person(s) in charge
DUROU JEAN DENIS

- Subject Traitement des données Audio-Visuelles

Person(s) in charge
DUROU JEAN DENIS

- Teaching Unit APPROXIMATION, INTERPOLATION, EDP

Description

The student knows interpolation and approximation models to fit data of first or second order. He also uses these polynomial or piecewise polynomial representations for modeling parametric curves and surfaces in the context of geometric modeling.

The student knows the finite element discretisation technique for solving partial differential equations. He is able to evaluate gradients of functional using adjoint computations. He also implements these techniques on a computer and is able to evaluate the quality of his solutions in terms of accuracy and performance.

Person(s) in charge
MORIN WEIMER GERALDINE

Bibliography

A practical guide to splines, C. de BOOR, 2001.

Curves and Surfaces for CAGD : A practical guide G. FARIN, 2001. (il existe une traduction en français)

A dynamic programming approach to curves and surfaces for geometric modeling, Ron Goldman, 2002

Subdivision for geometric design: A constructive approach, Warren, Weimer, 2001

- Subject Interpolation et Approximation

Objectives

Learn and practice the classical parametric models that are the basis on 3D modeling within CAD (Computer Aided Design) systems.

Targeted skills

The student knows interpolation and approximation models to fit data of first or second order. He also uses these polynomial or piecewise polynomial representations for modeling parametric curves and surfaces in the context of geometric modeling.

Number of hours

7 CTD, 8 TP (1 projet)

Person(s) in charge

MORIN WEIMER GERALDINE

Teaching method

En présence

Teaching language

Français

Bibliography

A practical guide to splines, C. de BOOR, 2001.

Curves and Surfaces for CAGD : A practical guide G. FARIN, 2001. (il existe une traduction en français)

A dynamic programming approach to curves and surfaces for geometric modeling, Ron Goldman, 2002

Subdivision for geometric design: A constructive approach, Warren, Weimer, 2001

- Subject E.D.P.**Pre-requisites**

Lebesgue integral, linear algebra, optimisation

Objectives

The student knows the finite element discretisation technique for solving partial differential equations. He is able to evaluate gradients of functional using adjoint computations. He also implements these techniques on a computer and is able to evaluate the quality of his solutions in terms of accuracy and performance.

Person(s) in charge

GRATTON SERGE

- Teaching Unit IMAGE, RENDU, MODELISATION**Person(s) in charge**

MARTHON PHILIPPE

- Subject Traitement Image**- Subject Modélisation****Person(s) in charge**

MARTHON PHILIPPE

- Teaching Unit PROGRAMMATION MOBILE ET APPRENTISSAGE PROFOND**Person(s) in charge**

CARLIER AXEL

- Subject Programmation Mobile

Description

This course offers an introduction to Android programming on mobile device with a particular focus on multimedia applications.

In the first part of the course a general overview of the framework and the inner architecture is presented.

Emphasis is placed on the life-cycle of applications, the Android task paradigm, the intent-based communication among applications and the graphical interfaces.

In the second part the course focus on the multimedia aspects of the Android programming with particular attention to the efficient processing of the video stream of the camera.

The course presents two common solutions that enable real-time processing of a large amount of data such as images and video stream: JNI native programming, which take advantage of native code to speed up data-intensive computations, and Renderscript, which offers a high-level API for acceleration that exploits heterogeneous hardware (CPU-GPU).

In the practical part of the course, students get familiar with the general Android frameworks and the different tools required to develop an application (Android Studio, Android Emulator etc) and develop applications to manage video streams and process the camera stream.

Person(s) in charge
GASPARINI SIMONE

Bibliography

- Liang, Sheng (1999). The Java Native Interface: Programmer's Guide and Specification, Addison-Wesley Professional
- Marchetti, Alberto (2016). RenderScript: parallel computing on Android, the easy way

- Subject Apprentissage Profond

Person(s) in charge
CARLIER AXEL

- Semestre 8 SN FISE Parcours Réseaux

Person(s) in charge
JAKLLARI GENTIAN

- Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.2 : Debates

Pre-requisites

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write an reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours

21 hours

Person(s) in charge

LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language**Person(s) in charge**

BLANCO ANDRE

Choice: 1 Among 1 :

- Subject Spanish

- Subject Spanish

- Subject Chinese

- Subject Italian

- Subject Japanese

- Subject Russian

- Subject German

- Subject french (as a foreign language)

- Subject Sports

- Subject Leadership & Management

Person(s) in charge
HULL ALEXANDRA

- Teaching Unit SCIENCES ET INGENIERIE DES RESEAUX

Objectives

The purpose of this unit is threefold, addressing the theoretical and practical aspects of network performance, quality of service and the analysis of complex networks.

The goal is, first, to learn to analyze and evaluate the performance of computer systems from stochastic models. We will first study the Markov decision process, which is a general framework for optimizing stochastic models, and in particular Markov chains. We will then study the performance of the most important scheduling policies in practice. We will finish by studying the allocation of resources in networks, with particular attention to TCP

Then we will learn how to analyze complex and dynamic networks and model them using random graphs. Master the notions of small worlds, preferential attachment, temporal graphs. The problems of network analysis are applied to social networks, dynamic network analysis, link analysis, robustness analysis, pandemic analysis (infection times, recovery times, ...), web links analysis (page ranking, ...), measures of centrality, ...

Master spectral analysis tools for complex networks, measurement tools, analysis of dissemination phenomena, communities, ... and interdependence between networks (degrees of correlation, ...).

Person(s) in charge
DHAOU RIADH

Bibliography

- Srikant, R. and Ying, Lei, Communication Networks: An Optimization, Control and Stochastic Networks Perspective, Cambridge University Press (2014)

- M. Harchol-Balter, Performance Modeling and Design of Computer Systems: Queueing Theory in Action, Cambridge University Press, 2013

- S. Ross, Introduction to stochastic dynamic programming, Academic Press, 1983

- Network Science, de Albert-László Barabási, Mars 2016

- Subject Qualité de service

Person(s) in charge
CHAPUT EMMANUEL

- Subject Contrôle et Apprentissage

Person(s) in charge
AYESTA MORATE URTZI

- Subject Science de Réseaux

Person(s) in charge
DHAOU RIADH

- Subject Projet Ingénierie de Réseaux

Person(s) in charge
DHAOU RIADH

- Teaching Unit SYSTEMES, APPLICATIONS MOBILES ET SECURITE

Description

At the end of this UE, the student knows about the stakes at play, the methods and the best practices tailored for systems, security and mobiles application programming ; he knows the major mechanisms underlying these technologies and is able to leverage this knowledge to design and evaluate secured applications for fixed or mobile systems.

The first class introduces the core principles of operating systems (file, process, memory management). The student gets as well the basics in multithread programming.

The second class is dedicated to mobile application design. Labs and project programs are developed for Android systems. The project's aim is to have an application that enables 2 mobile devices to exchange data over a wireless interface (e.g. Bluetooth, WiFi).

The last class presents the basics of security for computer systems (definitions, problems and risks) focusing specially on network security.

Person(s) in charge
JAFFRES-RUNSER KATIA

Bibliography

Systèmes d'exploitation, Andrew Tanenbaum, 2008, Edition Pearson

Android Developer <https://developer.android.com/develop/index.html>

- Subject Système d'Exploitation

Person(s) in charge
ERMONT JEROME

- Subject Programmation de Mobiles

Pre-requisites

Systèmes d'exploitation

Technologies Objet

Applications concurrentes et communicantes

Conception et programmation avancée

Objectives

Know how to design and program a mobile app that enables two mobile terminals to exchange data through a wireless network interface.

Targeted skills

Define and implement Android activities and services,

Define and implement processing in tasks,

Implement message passing between tasks and activities via handlers,

Implement a communication socket

Description

This class presents the main elements to start programming Android applications. The core concepts of activities, services, intents, asynchronous tasks and handlers are presented, and manipulated in labs. A projet validates these concepts by asking students to write an app that has two phones exchange data directly through a wireless network technology.

Number of hours

1CM, 2TP and one project of 10 sessions volume (only 3 are supervised).

Person(s) in charge

JAFFRES-RUNSER KATIA

- Subject Sécurité

Pre-requisites

- * C and assembly programming
- * TCP/IP stack and Ethernet datalink
- * Complexity, arithmetics and algebra basics

Objectives

General awareness regarding systems and network cybersecurity concerns.

Targeted skills

Implement common network security architectures thanks to linux + netfilter and iptables.

Configure a confidential and authenticated network link thanks to IPSec + IKE and linux setkeys + racoon.

Develop a baremetal shellcode for modern GNU/linux applications.

Description

Cybersecurity is a broad topic which covers a large amount of scientific domains. In terms of threat model and forensic experience, the attacker is using anytime the weakest point of attack surface to defeat the system defenses. Therefore, we propose to cover in this class a wide number of security concerns in order to teach the essential level of knowledge required to avoid most of modern systems and network vulnerabilities.

Targeted general skills and essential background :

- * Being able to deploy, develop or configure systems and networks with the required security level.
- * Understand the purpose of intrusion tolerant network architectures.
- * Understand and use basic coding rules in order to avoid most common software vulnerabilities.
- * Understand the purpose of main cryptographic primitives, their security model and the limitations in which they have been designed.

Number of hours

15 slots

Teaching method

En présence

Teaching language

French

- Teaching Unit IDM ET DEVELOPPMENT WEB**Person(s) in charge**

MAURAN PHILIPPE

- Subject Application Web**Objectives**

Présentation des principes et technologies de base dans le domaine des applications web, permettant la construction de sites web dynamiques

Description

- les formats et protocoles du web
- les pages web dynamiques (servlets, JSP)
- les Enterprise Java Bean (EJB, MVC)
- les couches de persistance (JDBC, JPA)
- les frameworks JavaScript (Angular, JQuery)

Person(s) in charge

HAGIMONT DANIEL

- Subject Base de données**Person(s) in charge**

OSTERMANN PASCAL

- Subject IDM**Person(s) in charge**

OUEDERNI MERIEM

- Teaching Unit INTERCONNEXION ET MODELISATION DES RESEAUX**Person(s) in charge**

DHAOU RIADH

- Subject Evaluation de Perfomance

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Simulation de Réseaux

Person(s) in charge
DHAOU RIADH

- Subject Interconnexion

Person(s) in charge
BEYLOT ANDRE LUC

- Teaching Unit SYSTEMES DE TELECOM SANS FIL ET MOBILES 2

Person(s) in charge
JAKLLARI GENTIAN

- Subject Réseaux Mobiles

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Réseaux Sans-Fil

Pre-requisites

A good understanding of the TPC/IP. Some basic notions of the wireless physical layer.

Objectives

An in-depth understanding of the key challenges involved in designing protocols for wireless networks. A good understanding of the architectural differences between different wireless technologies.

Targeted skills

Be capable of designing and implementing a wireless network based on a set of requirements stemming from particular user and application needs.

Description

This course presents the main challenges related to the design and implementation of wireless networks and how they are addressed in some of the major technologies in the market, in particular WiFi and Bluetooth.

Person(s) in charge
JAKLLARI GENTIAN

Teaching method
En présence

Teaching language
English

Bibliography

[1] Computer Networking: A Top-Down Approach (7th Edition), by James Kurose, Keith Ross

[2] Mobile Communications (2nd Edition) by Jochen Schiller

- Subject Couches Physique

Person(s) in charge
ESCRIG BENOIT

- Subject Projet de Réseaux Sans Fil

Person(s) in charge
DHAOU RIADH

- Semestre 8 SN FISE Parcours Systèmes de Télécommunications

Person(s) in charge
POULLIAT CHARLY

- Teaching Unit Soft and Human Skills

Person(s) in charge
HULL ALEXANDRA

- Subject Professional English 2.2 : Debates

Pre-requisites

None

Objectives

Perform key oral and written workplace tasks in English.

Targeted skills

- 1) Develop interactional communication and argumentation skills by actively participating in debates in English.
- 2) Write a reaction paper effectively in English.
- 3) Present your professional project convincingly during a job interview in English.

Description

A semester of 12 interactive weekly sessions to develop English intercultural communication competencies for professional purposes.

Number of hours
21 hours

Person(s) in charge
LAKE PETER

Teaching method

En présence

Teaching language

English

Bibliography

- * Heinrichs, J. (2017). *Thank you for arguing: What Aristotle, Lincoln, and Homer Simpson can teach us about the art of persuasion*. Three Rivers Press (CA).
- * Turabian, K. L. (2010). *Student's guide to writing college papers*. University of Chicago Press.
- * Kelley, T. (2017). *Get That Job!: The Quick and Complete Guide to a Winning Interview*. Plovercrest Press.

- Second language**Person(s) in charge**

BLANCO ANDRE

Choice: 1 Among 1 :

- **Subject Spanish**

- **Subject Spanish**

- **Subject Chinese**

- **Subject Italian**

- **Subject Japanese**

- **Subject Russian**

- **Subject German**

- **Subject french (as a foreign language)**

- **Subject Sports**

- **Subject Leadership & Management**

Person(s) in charge

HULL ALEXANDRA

- Choix d'UE-2ASN-S8-Parcours T

Choice: 1 Among 1 :

- **Teaching Unit OPTIMISATION ET APPRENTISSAGE**

Person(s) in charge

POULLIAT CHARLY

Bibliography

VHDL - langage, modélisation, synthèse (R. AIRIAU et al. - Presses Polytechniques et Universitaires Romandes)

- Subject Algorithmes adaptifs et distribués

Person(s) in charge
POULLIAT CHARLY

- Subject Optimisation pour les Télécommunications

Person(s) in charge
DHAOU RIADH

- Subject Détection, Classification et Apprentissage

Person(s) in charge
POULLIAT CHARLY

- Subject Modélisation de Réseaux

Person(s) in charge
DHAOU RIADH

- Teaching Unit PROJET PERSONNEL

Person(s) in charge
COULON MARTIAL

- Subject Projet Personnel

Pre-requisites

No pre-requisite.

Objectives

This modulus consists in a project whose subject is given by a company, and which is conducted in collaboration with engineers of that company. The work is mainly done at school, but meetings and working visits can also take place in the company premises.

The main objective consists then, before the summer internship, in better understanding the way a concrete project is addressed and what specific constraints can occur in the workplace.

Targeted skills

The main skill consists in acquiring a professional approach of the implementation of a technical project.

There is no specific technical skill since the subject of the project is at choice (to define with the company) in the fields of the Sciences du Numérique diploma, which may correspond to very wide range of competences.

Description

Students, by groups of 2 or 3, have to find a company and a project subject of their choice.

To that end, they are assisted by the responsible of this modulus.

They can choose a subject allowing them to further investigate a field of the option Communications Systems (e.g. a subject on error-correcting codes for satellite communications, with a industrial of that field), or at the contrary they can choose a subject that they will not particularly study in this option, and which will allow them to spread the spectrum of their skills (for instance, a subject on AI in a concrete case-study, or a subject on embedded systems using Arduino coding).

Person(s) in charge
COULON MARTIAL

- Teaching Unit RECEPTEURS NUMERIQUES AVANCEES

Description

The first part of this teaching unit is dedicated to technics used to design telecommunication digital receivers: multirate digital receivers, digital filter banks, synchronization algorithms. These techniques will be used in the design of a DVB receiver. The second part of this teaching unit is dedicated to spread spectrum systems (CDMA, UWB, CSS): dimensioning, performances, associated receiver.

Person(s) in charge
BOUCHERET MARIE LAURE

Bibliography

- "Multirate Systems And Filter Banks", P. P. Vaidyanathan, Prentice Hall
- "Synchronization Techniques for Digital Receivers", Umberto Mengali, Aldo N. D'Andrea, Springer
- "Spread Spectrum Systems for GNSS and Wireless Communications", Jack K. Holmes, Artech House 2007
- "Principles of Spread-Spectrum Communication Systems", Don Torrieri, 4th ed. 2018 Edition, Spinger

- Subject Bancs de filtres

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Conception de Récepteur

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Syst.èmes à Etalement de Spectre

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Projet

Person(s) in charge
BOUCHERET MARIE LAURE

- Teaching Unit SYSTEME NUMERIQUE DE TRAITEMENT DE L'INFORMATION

Objectives

The aim of this course is to present the main digital processors in use in the telecommunication industry. A first part will be dedicated to the study of FPGA processeurs and their programming using the VHDL language.

The second part will be dedicated to specific processors like DSP or GPU processors, while introducing algorithm design methodologies for hardware implementation.

Person(s) in charge
GUIVARCH RONAN
ERMONT JEROME

Bibliography

VHDL - langage, modélisation, synthèse (R. AIRIAU et al. - Presses Polytechniques et Universitaires Romandes)

- Subject FPGA : Architecture et Programmation

Person(s) in charge
GUIVARCH RONAN

- Subject Architectures de Traitement de l'Informat° dédiées, Introduct°

Person(s) in charge
ERMONT JEROME

- Teaching Unit SYSTEMES DE TELECOM SANS FIL ET MOBILES 1

Objectives

This teaching unit focus on 2G and 3G mobile networks architectures (GSM, GPRS, UMTS).

The main objectives consist on understanding the successive architectures which have been proposed and their evolution.

By the end of the teaching unit, the students will be able to assess the physical layers of 2G and 3G communication systems.

Person(s) in charge
ESCRIG BENOIT

Bibliography

Xavier Lagrange, Philippe Godlewski, Sami Tabbane, Réseaux GSM, Editions Hermès Science (5ème édition), Paris 2000

Xavier Lagrange, Principes et évolutions de l'UMTS, Hermès, Paris 2005

- Subject Réseaux Mobiles

Person(s) in charge
BEYLOT ANDRE LUC

- Subject Réseaux Sans-Fil

Pre-requisites

A good understanding of the TCP/IP. Some basic notions of the wireless physical layer.

Objectives

An in-depth understanding of the key challenges involved in designing protocols for wireless networks. A good understanding of the architectural differences between different wireless technologies.

Targeted skills

Be capable of designing and implementing a wireless network based on a set of requirements stemming from particular user and application needs.

Description

This course presents the main challenges related to the design and implementation of wireless networks and how they are addressed in some of the major technologies in the market, in particular WiFi and Bluetooth.

Person(s) in charge
JAKLLARI GENTIAN

Teaching method
En présence

Teaching language
English

Bibliography

[1] Computer Networking: A Top-Down Approach (7th Edition), by James Kurose, Keith Ross

[2] Mobile Communications (2nd Edition) by Jochen Schiller

- Subject Couches Physique

Person(s) in charge
ESCRIG BENOIT

- Teaching Unit SYSTEMES, APPLICATIONS MOBILES ET SECURITE

Description

At the end of this UE, the student knows about the stakes at play, the methods and the best practices tailored for systems, security and mobiles application programming ; he knows the major mechanisms underlying these technologies and is able to leverage this knowledge to design and evaluate secured applications for fixed or mobile systems.

The first class introduces the core principles of operating systems (file, process, memory management). The student gets as well the basics in multithread programming.

The second class is dedicated to mobile application design. Labs and project programs are developed for Android systems. The project's aim is to have an application that enables 2 mobile devices to exchange data over a wireless interface (e.g. Bluetooth, WiFi).

The last class presents the basics of security for computer systems (definitions, problems and risks) focusing specially on network security.

Person(s) in charge

JAFFRES-RUNSER KATIA

Bibliography

Systèmes d'exploitation, Andrew Tanenbaum, 2008, Edition Pearson

Android Developer <https://developer.android.com/develop/index.html>

- Subject Système d'Exploitation

Person(s) in charge

ERMONT JEROME

- Subject Programmation de Mobiles

Pre-requisites

Systèmes d'exploitation

Technologies Objet

Applications concurrentes et communicantes

Conception et programmation avancée

Objectives

Know how to design and program a mobile app that enables two mobile terminals to exchange data through a wireless network interface.

Targeted skills

Define and implement Android activities and services,

Define and implement processing in tasks,

Implement message passing between tasks and activities via handlers,

Implement a communication socket

Description

This class presents the main elements to start programming Android applications. The core concepts of activities, services, intents, asynchronous tasks and handlers are presented, and manipulated in labs. A projet validates these concepts by asking students to write an app that has two phones exchange data directly through a wireless network technology.

Number of hours

1CM, 2TP and one project of 10 sessions volume (only 3 are supervised).

Person(s) in charge

JAFFRES-RUNSER KATIA

- Subject Sécurité

Pre-requisites

- * C and assembly programming
- * TCP/IP stack and Ethernet datalink
- * Complexity, arithmetics and algebra basics

Objectives

General awareness regarding systems and network cybersecurity concerns.

Targeted skills

Implement common network security architectures thanks to linux + netfilter and iptables.

Configure a confidential and authenticated network link thanks to IPSec + IKE and linux setkeys + racoon.

Develop a baremetal shellcode for modern GNU/linux applications.

Description

Cybersecurity is a broad topic which covers a large amount of scientific domains. In terms of threat model and forensic experience, the attacker is using anytime the weakest point of attack surface to defeat the system defenses. Therefore, we propose to cover in this class a wide number of security concerns in order to teach the essential level of knowledge required to avoid most of modern systems and network vulnerabilities.

Targeted general skills and essential background :

- * Being able to deploy, develop or configure systems and networks with the required security level.
- * Understand the purpose of intrusion tolerant network architectures.
- * Understand and use basic coding rules in order to avoid most common software vulnerabilities.
- * Understand the purpose of main cryptographic primitives, their security model and the limitations in which they have been designed.

Number of hours

15 slots

Teaching method

En présence

Teaching language

French

- Semestre 8 à l'Etranger

Choice: 1 Among 1 :

- Teaching Unit Semestre d'Etudes à la TU-Darmstadt (Allemagne)

- Teaching Unit Semestre d'Etudes à l'Université de Hong Kong

- Teaching Unit Sem TU-Delft (Pays-Bas)

- Teaching Unit Semestre d'Etudes Queensland U.T. (Australie)

- Teaching Unit Semestre d'étude à l'université de LEUVEN-KU (Belgique)
- Teaching Unit Semestre d'étude à l'Univ.VAASA (Finlande)
- Teaching Unit Semestre d'études Université de Cordoba (Argentine)
- Teaching Unit Sem. d'études Polytechnic Inst, Ho Chi Minh Ville (Vietnam)
- Teaching Unit Semestre d'étude Pontifica Javeriana, Bogota (Colombie)
- Teaching Unit Semestre d'études Louvain (Univ. Cath) (Belgique)
- Teaching Unit Semestre d'Etudes INHA, Incheon, Corée du Sud
- Teaching Unit Semestre d'Etudes Universidad Nacional de Columbia (UNAL)
- Teaching Unit Semestre à l'Université d'Uppsala (Suède)
- Teaching Unit Sem. Univ.Libre Bruxelles
- Teaching Unit Semestre d'Etudes à l'Université de Lima (Pérou)
- Teaching Unit Semestre d'Etudes à l'Université de Karlsruhe (Allemagne)
- Teaching Unit Semestre d'Etude à l'Université de Hamburg (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Université de La Paz (Bolivie)
- Teaching Unit Semestre d'Etudes à Ecole Polytechnique de Montréal (Canada)
- Teaching Unit Semestre d'Etudes à l'Université de Stavanger (Norvège)
- Teaching Unit Semestre d'Etudes à l'Université de Trondheim (Norvège)
- Teaching Unit Semestre à la TU-Berlin (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Imperial College de Londres (GB)
- Teaching Unit Semestre d'Etudes à l'Univ. d'Auckland (Nouvelle-Zélande)
- Teaching Unit Semestre d'Etudes à l'Univ. de Birmingham (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. College Cork (Irlande)

- Teaching Unit Semestre d'Etudes à l'Univ. de Coventry (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. d' Edimbourg (UK)
- Teaching Unit Semestre d'Etudes à l'EPFL, Lausanne (Suisse)
- Teaching Unit Semestre d'Etudes à la Fac. Polytech. de Mons (Belgique)
- Teaching Unit Semestre d'Etudes à l'UFSC, Florianopolis (Brésil)
- Teaching Unit Semestre d'Etudes à Georgia Tech, Atlanta (USA)
- Teaching Unit Semestre d'Etudes à l'Univ. de Lund (Suède)
- Teaching Unit Semestre d'Etudes à la TU-Hambourg (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Madrid (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Mondragon (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Nottingham (UK)
- Teaching Unit Semestre d'Etudes à l'Univ. de Recife (Brésil)
- Teaching Unit Semestre d'Etudes à l'Univ. de Saragosse (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Sydney (Australie)
- Teaching Unit Semestre d'Etudes à la TU-Brême
- Teaching Unit Semestre d'Etudes à la TU-Eindhoven (Pays-Bas)
- Teaching Unit Semestre d'Etudes à la TU-Münich (Allemagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Laval (Canada)
- Teaching Unit Semestre d'Etudes à l'Université de Bergen (Norvège)
- Teaching Unit Semestre d'Etudes à l'Univ. Complutense, Madrid (Espagne)
- Teaching Unit Semestre d'Etudes à l'Univ. de Pavie (Italie)
- Teaching Unit Semestre d'Etudes à l'Univ. Montréal (Canada)

- Teaching Unit Semestre d'Etudes à l'Univ. de Valence (Espagne)
- Teaching Unit Semestre d'Etudes à Concordia, Canada
- Teaching Unit Semestre d'Etudes à California Davis Univ. , USA
- Teaching Unit Semestre ETH Zürich, Suisse
- Teaching Unit Semestre Université de Stockholm, Suède
- Teaching Unit Semestre d'Etudes à l'Univ. de Purdue (USA)
- Teaching Unit Semestre d'Etudes à l'Univ. de Rio UFRJ (Brésil)
- Teaching Unit Semestre d'Etudes à l'Université de Concepcion (Chili)
- Teaching Unit Semestre d'Etudes à l'Univ. de Dublin DCU (IRL)
- Teaching Unit Semestre d'Etudes à l'Univ. de Sherbrooke (CAN)
- Teaching Unit Semestre d'Etudes à l'Univ. de Barcelone UPC (ESP)
- Teaching Unit Semestre d'Etudes à l'Univ. de Shanghai JTU (Chine)
- Teaching Unit Semestre d'Etudes à l'Université de Séville (Espagne)
- Teaching Unit Semestre d'Etudes à l'Université de Palerme (Italie)
- Teaching Unit Semestre d'Etudes à l'Université de Klagenfurt (Autriche)
- Teaching Unit Semestre d'Etudes à l'Université de Pampelune (ESP)
- Teaching Unit Semestre d'Etudes à la DTU Copenhague
- Teaching Unit Semestre d'Etudes à l'Université d'Arequipa (Pérou)
- Teaching Unit Semestre d'Etudes à l'Université de Belfast (GB)
- Teaching Unit Semestre d'Etudes à l'ETSEIB Barcelone (Espagne)
- Teaching Unit Sem Université de Florence
- Teaching Unit Sem EHTP Casablanca (Maroc)

· Teaching Unit Sem Univ. Aachen

· Teaching Unit Sem Université Stuttgart

· Teaching Unit Semestre d'études à l'Université de Cranfield

· Teaching Unit Semestre d'études au Royal Holloway London

· Teaching Unit Sem Aalborg

· Teaching Unit Sem St Andrews

· Teaching Unit Semestre d'études au Polytec. Turin

· Teaching Unit Semestre d'Etudes à l'Université de Chalmers (Suède)

· Teaching Unit Semestre d'Etudes à l'Univ. de Cracovie

· Teaching Unit Semestre d'Etudes à la Wrije Univ. Bruxelles

· Teaching Unit Semestre d'Etudes à l'Univ. de Guadalajara (Mexique)

· Teaching Unit Semestre d'Etudes à l'Univ. de Chengdu (Chine)

· Teaching Unit Semestre d'Etudes à l'Univ. de Bahia Blanca (Argentine)

· Teaching Unit Semestre d'Etudes Erasmus Mundus IMETE

· Teaching Unit Semestre d'Etudes Univ. d'Oxford

· Teaching Unit Semestre d'études Université de Tomsk, Russie

· Teaching Unit Semestre d'études Université de Buenos Aires

· Teaching Unit Semestre d'études UPB Bucarest

· Teaching Unit Semestre d'Etudes à l'Université de Sonara (Mexique)

· Teaching Unit Sem Université Wuhan HUST, Chine

· Teaching Unit Sem Université Delhi DTU

· Teaching Unit Sem Université de Gdansk, Pologne

· Teaching Unit Sem USTH, Hanoï

· Teaching Unit Sem Univ. Rome Tor Vergata

· Teaching Unit Sem Université Nationale Taiwan

· Teaching Unit Sem ETS Montréal

· Teaching Unit Sem Université Varsovie

· Teaching Unit Semestre d'Etudes à Narvik University College (Norvège)

· Teaching Unit Semestre d'Etudes à l'Université de Twente (Pays-Bas)

· Teaching Unit Semestre d'études à l'univ. du Pays Basque Bilbao (ESP)

· Teaching Unit Sem Technicka Univerzita v Liberci, Liberec, Rép. Tchèque

· Teaching Unit Semestre d'Etudes à l'Université de Manchester

· Teaching Unit Semestre d'Etudes Université de Chicoutimi, Canada

· Teaching Unit Semestre d'Etude à l'Univ. Valparaiso, Chili

· Teaching Unit Semestre d'Etudes Séoul National University

· Teaching Unit Sem Firenze-UDSDF-Italie

· Teaching Unit Sem Constance (Allemagne)

· Teaching Unit Semestre à Bologne (Italie)

· Teaching Unit Semestre d'Etudes à l'Université d'Amsterdam

· Semestre 8 - Hors N7en France

Choice: 1 Among 1 :

· Teaching Unit Semestre d'étude à l'ESC Toulouse

· Teaching Unit Semestre IAE Toulouse

· Teaching Unit Semestre ESC Rouen

- Teaching Unit Semestre EMLyon
- Teaching Unit Semestre d'Etudes à l'ISAE
- Teaching Unit Semestre d'Etudes à l'ENSIMAG
- Teaching Unit Semestre d'étude à Paris 6 Jussieu
- Teaching Unit Semestre Université Paris-Dauphine
- Teaching Unit Semestre d'études à Télécom Management
- Teaching Unit Semestre d'Etudes à Centrale Nantes
- Teaching Unit Semestre d'Etudes à l'Ecole Navale, Brest
- Teaching Unit Semestre d'études à Sciences Po Paris
- Teaching Unit Semestre d'études à Télécom Sud Paris
- Teaching Unit Semestre d'étude à Eurecom
- Teaching Unit Semestre d'études Toulouse Business School
- Teaching Unit Semestre Supelec
- Teaching Unit Semestre IFP
- Teaching Unit Semestre d'études à l'Université de Montpellier
- Teaching Unit Semestre d'études à l'ESSEC
- Teaching Unit Semestre ENAC
- Teaching Unit Semestre IAE Paris
- Teaching Unit Semestre IAE Lyon
- Teaching Unit Semestre d'études à l'ENSPM
- Teaching Unit Semestre à l'Ecole Polytechnique, Palaiseau
- Teaching Unit Semestre d'Etudes à l'ENSAE

· Teaching Unit Université Paris-Saclay

· Teaching Unit Semestre d'études à l'ENM

· Teaching Unit Semestre d'études à l'ENSE3

· Teaching Unit Semestre d'études à l'ENSTA

· Teaching Unit Semestre d'études à HEC Paris

· Teaching Unit Semestre A7 Génie des Systèmes Industriels

· Teaching Unit Semestre INSTN

· Nombre de semaines Stage 1ère Année

· Mobilité 1ère Année FISE-FISA

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

Ingénieur ENSEEIHT Informatique et Télécommunications 3ème année

MORE INFO

ECTS credits : 60

Organization

· Année 3A Informatique et Télécommunication (SN)

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications