Teaching program

Informatique

Academic year 2023-2024

Ecole polytechnique de Nantes Université

November 13, 2023

Contents

Part I

Tables of teaching units

Semester 5 - unit *IDIA 3*

Activités apprentis en entreprise — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Activité apprentis en entreprise FISA S5						150	*1*
TOTAL	0	0	0	0	0	150	

Architectures et systèmes informatiques — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Modèle et langage relationnel FISA	15		15			15	*2*
• Introduction aux systèmes distribués FISA	7.5		7.5			8	*1*
• Systèmes informatiques FISA	12		18			12	*1.5*
TOTAL	34.5	0	40.5	0	0	35	

Informatique fondamentale — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Automates et probabilités FISA	10	10				10	*1*
• Logique FISA	8	12				10	*1*
• Théorie des graphes FISA	10	10				10	*1*
TOTAL	28	32	0	0	0	30	

Programmation et algorithmes — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Algorithmique et structures de données FISA	20		20			20	*1*
• Introduction au développement logiciel S5 FISA	7		7			10	*1*
• Projet de développement logiciel FISA	5		45				*1*
TOTAL	32	0	72	0	0	30	

Humanités S5 FISA — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Analyse de la pratique		2					*0*
• Enjeux de société et entreprise		4					*0*
• Projet de séjour international		8					*0.2*
• Sciences sociales appliquées au travail		28					*0.5*
• Toeic & Professional English		22.5				10	*0.15*
• Conférences d'entreprises		4.5					*0*
• Economy		20					*0.15*
TOTAL	0	89	0	0	0	10	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	94.5	121	112.5	0	0	255	30
Face-to-face sum	328						

Semester 5 - unit *INFO 3*

Data, modelling, reasonning — ECTS : 8

Manager : KUNTZ-COSPEREC Pascale

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Classical Logics	7.5	10.5				18	*1.5*
• Relational data model	5	10.5	6			27	*3*
• Probability	6.25	4.5	1.5			12	*1.5*
• Statistical processing of information 1	10	10.5				28.75	*2*
TOTAL	28.75	36	7.5	0	0	85.75	

Algorithms — ECTS : 7

Manager : PICAROUGNE Fabien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Algorithms & programming	8.75	9	24			30	*2*
• Algorithmic competitive project with python	3.75		6			20	*1*
• Graph theory	10	7.5				23	*1*
TOTAL	22.5	16.5	30	0	0	73	

Exploiting computer systems 1 — ECTS : 7

Manager : RICORDEL Vincent

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Concurrency in algorithms	6.25	4.5	6			11	*1.5*
• Relational Database Management Systems	10	10.5	6			17	*2*
• Introduction to computer networks	3.75	10.5	15			30.5	*3*
• Computer and operating systems 1	5	1.5	18			10	*2*
TOTAL	25	27	45	0	0	68.5	

Humanities and Professionnal Issues S5 — ECTS : 8

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Business knowledge and entrepreneurship	3	13.5				4	*13*
• Physical education and sport 1		21				2	*13*
• Professionnal project 1	1.5	12				4.5	*13*
• Sustainable development and social responsability 1	1.5	13.5					*13*
• Project management 1	4.5		3			2	*13*
• Grammar and professional English 1		40					*35*
TOTAL	10.5	100	3	0	0	12.5	

Accueil

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Consolidation in algorithms & programming	8.75					10	*0*
• Preliminaries: Computer and operating systems	3.75					3	*0*
• Consolidation in computer networks	6.25						*0*
• Accueil : modèle de données relationnel (MDR)	10						*0*
TOTAL	28.75	0	0	0	0	13	

Accueil mathématiques

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Accueil : probabilités	5	1.5					*0*
• Consolidation in linear algebra and calculus	13.75					10	*0*
TOTAL	18.75	1.5	0	0	0	10	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	134.25	181	85.5	0	0	262.75	30
Face-to-face sum	400.75						

Semester 6 - unit *IDIA 3*

Activité en entreprise S6 FISA

ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Activité en entreprise FISA						150	*1*
TOTAL	0	0	0	0	0	150	

Humanités S6 FISA

ECTS : 7

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Analyse de la pratique FISA S6		4					*0*
• Enjeux de société et entreprise FISA S6		16					*0.25*
• Projet de séjour à l'international FISA S6		8					*0*
• Sciences sociales appliquées au travail FISA S6		21					*0.25*
• Toeic & public speaking		22.5				10	*0.25*
• Conférences d'entreprises		4.5					*0*
• Accounting business game + Biodiversity fresco		35					*0.25*
TOTAL	0	111	0	0	0	10	

Mathématiques appliquées

ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Algèbre linéaire FISA	7	8					*1*
• Statistiques et probabilités FISA	15	15		15			*2*
TOTAL	22	23	0	15	0	0	

Systèmes d'information

ECTS : 5

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Conception des systèmes d'information FISA	7	7	6				*1*
• Systèmes transactionnels FISA S6	6.5	4	3				*1*
• Traitement de requêtes FISA S6	9.5	8.5	3				*1*
TOTAL	23	19.5	12	0	0	0	

Logiciel

ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Programmation Java FISA	10	5	25				*1.5*
• Technologies du web FISA	10		20				*1*
TOTAL	20	5	45	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	65	158.5	57	15	0	160	30
Face-to-face sum	295.5						

Semester 6 - unit *INFO 3*

Exploiting computer systems 2 — ECTS : 6

Manager : LEHN Rémi

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Computer networks 2 - Protocol design		9	9			12	*1.5*
• Operating systems 2	14.5	1.5	16.5			17	*2*
• Database query processing	5	7	3			15	*1.5*
TOTAL	19.5	17.5	28.5	0	0	44	

Data and information analysis — ECTS : 5

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Fourier analysis		13.5				10	*1*
• Information theory	8.75	6				10	*1*
• Statistical Processing of Information 2	10	1.5	10.5			10	*1.5*
TOTAL	18.75	21	10.5	0	0	30	

Humanities and Professionnal Issues S6 — ECTS : 8

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• History of organizations and Accounting business game	9	10.5	12			5	*15*
• Physical education and sport 2		21				2	*15*
• Soft skills		7.5					*15*
• Socio-economic debates and Tools for shifting		21				10	*15*
• Professional Project 2		4.5					*5*
• Grammar, Toeic and professional English 2		39	2				*35*
TOTAL	9	103.5	14	0	0	17	

Software Engineering 2 — ECTS : 9

Manager : PICAROUGNE Fabien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Information systems design and modelling	10	7.5	3			8	*1.5*
• Human-computer interaction	5	7.5				8	*1.5*
• C language	8.75	1.5	12			12	*2*
• Mini projet programmation objet	2.5	2.5				25	*2*
• Modelling-Web-HCI project		12				30	*2*
• Object-oriented programming and Java	11	2	13.5			16	*2*
• Web Technologies	16.25	1.5	12			8	*1.5*
TOTAL	53.5	34.5	40.5	0	0	107	

3rd year internship ECTS : 2

Manager : NACHOUKI Marie-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 3rd year internship							*1*
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	100.75	176.5	93.5	0	0	198	30
Face-to-face sum	370.75						

Semester 7 - unit *IDIA4*

Humanités IDIA S7 — ECTS : 5

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Analyse de la pratique S7 FISA		2					*0*
• Enjeux de société et d'entreprise S7 FISA		8					*0*
• Projet de Séjour international S7 FISA		12					*0.15*
• SSAT FISA S7		28					*0.35*
• Corporate culture		15				16	*0.125*
• Toeic		15					*0.125*
• Conférences d'entreprises		4.5					*0*
• Business economy		16					*0.25*
TOTAL	0	100.5	0	0	0	16	

Introduction à l'intelligence artificielle — ECTS : 8

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Analyse de données et apprentissage S7 FISA	11.25	4.5	9	3			*1.5*
• Modélisation de problèmes et optimisation combinatoire FISA S7	11.25	1.5					*1*
• Projet analyse statistique de données FISA S7			50				*1.5*
• Techniques de base de l'IA - FISA S7	10	6		3			*1*
• Mini projet IA S7 FISA		9	15				*1*
TOTAL	32.5	21	74	6	0	0	

Logiciel et gestion de données — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Gestion de projet FISA S7		6					*0.5*
• Outils pour le développement logiciel S7 FISA	2.5		8				*1.5*
• Parallélisation de données FISA S7	2.5	1.5	3				*1*
• Programmation fonctionnelle S7 FISA	5	6	7.5				*2*
• SQL avancé et entrepôts de données - FISA S7	10	3	12			14.5	*2.5*
TOTAL	20	16.5	30.5	0	0	14.5	

Activité en entreprise S7 FISA — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Activité en entreprise S7 FISA							*1*
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	52.5	138	104.5	6	0	30.5	25
Face-to-face sum	301						

Semester 7 - unit *INFO 4 - Option 1*

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Project management 1	5	4.5					*1*
• Long-term industrial project 1	2.5			50		110	*5*
TOTAL	7.5	4.5	0	50	0	110	

Humanities S7 ECTS : 7

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Business analysis	4.5	6				3	*15*
• Quality, security and environmental approaches (QSE1)		3	3				*10*
• Physical education and sport 3		21				2	*10*
• Negotiations	3	7.5				2	*10*
• Professional project 3		6				6	*10*
• Circular economy	4.5	3				6	*10*
• Professional English 3		19	2				*26.25*
1 opt ▷ Continuous Assessment (bis)							*8.75*
1 opt ▷ French as a Foreign Language for engineering students		18					*8.75*
1 opt ▷ Second foreign language - Spanish		18					*8.75*
1 opt ▷ Second foreign language - Japanese		18					*8.75*
1 opt ▷ Second foreign language - Sign language		18					*8.75*
▷ Training for Toeic		18					*8.75*
TOTAL	12	83.5	5	0	0	19	

Interspecialty S7 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 3A Internship Assesment							*1*
1 opt ▷ Entrepreneurship S7				32			*1*
1 opt ▷ Transition Engineering and Interdisciplinarity S7				32			*1*
1 opt ▷ Research S7				32			*1*
▷ Ecological and Societal Transition S7				32			*1*
TOTAL	0	0	0	32	0	0	

Common courses - AI and combinatorial algorithmics ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Exploratory data analysis	11.25	4.5	9			16	*1.75*
• Cryptography	6.25	6				13.25	*1*
• Knowledge-based systems project			9			18	*1*
• Introduction to artificial intelligence	10	6				16	*1.25*
TOTAL	27.5	16.5	18	0	0	63.25	

Common courses - Advanced software engineering ECTS : 5

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced software project in C++	2.5			5		15	*1.5*
• Tools for Software Development	2.5		8			0.5	*1*
• Advanced object programming: C ++	13.75	1.5	15			20	*1.5*
• Functional programming	5	5.5	4.5			3	*1*
TOTAL	23.75	7	27.5	5	0	38.5	

Optional - Data modelling and visualization ECTS : 5

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Data parallelism	2.5	1.5	3			2	*1*
• Design of databases and data warehouses	10	3	12			14.5	*2*
• Data visualization	12.5	1.5	7.5			15	*2*
TOTAL	25	6	22.5	0	0	31.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	95.75	117.5	73	87	0	262.25	30
Face-to-face sum	373.25						

Semester 7 - unit *INFO 4 - Option 2*

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Project management 1	5	4.5					*1*
• Long-term industrial project 1	2.5			50		110	*5*
TOTAL	7.5	4.5	0	50	0	110	

Humanities S7 ECTS : 7

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Business analysis	4.5	6				3	*15*
• Quality, security and environmental approaches (QSE1)		3	3				*10*
• Physical education and sport 3		21				2	*10*
• Negotiations	3	7.5				2	*10*
• Professional project 3		6				6	*10*
• Circular economy	4.5	3				6	*10*
• Professional English 3		19	2				*26.25*
1 opt ▷ Continuous Assessment (bis)							*8.75*
1 opt ▷ French as a Foreign Language for engineering students		18					*8.75*
1 opt ▷ Second foreign language - Spanish		18					*8.75*
1 opt ▷ Second foreign language - Japanese		18					*8.75*
1 opt ▷ Second foreign language - Sign language		18					*8.75*
▷ Training for Toeic		18					*8.75*
TOTAL	12	83.5	5	0	0	19	

Interspecialty S7 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 3A Internship Assesment							*1*
1 opt ▷ Entrepreneurship S7				32			*1*
1 opt ▷ Transition Engineering and Interdisciplinarity S7				32			*1*
1 opt ▷ Research S7				32			*1*
▷ Ecological and Societal Transition S7				32			*1*
TOTAL	0	0	0	32	0	0	

Common courses - AI and combinatorial algorithmics ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Exploratory data analysis	11.25	4.5	9			16	*1.75*
• Cryptography	6.25	6				13.25	*1*
• Knowledge-based systems project			9			18	*1*
• Introduction to artificial intelligence	10	6				16	*1.25*
TOTAL	27.5	16.5	18	0	0	63.25	

Common courses - Advanced software engineering ECTS : 5

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced software project in C++	2.5			5		15	*1.5*
• Tools for Software Development	2.5		8			0.5	*1*
• Advanced object programming: C ++	13.75	1.5	15			20	*1.5*
• Functional programming	5	5.5	4.5			3	*1*
TOTAL	23.75	7	27.5	5	0	38.5	

Optional - Computer networks and parallelism ECTS : 5

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Parallel Computing	8.75	1.5	9			9	*1.75*
• Cloud computing/DevOps	2.5	1.5	3			10	*1*
• Computer networks 3	10	1.5	12			17.5	*2.25*
TOTAL	21.25	4.5	24	0	0	36.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	92	116	74.5	87	0	267.25	30
Face-to-face sum	369.5						

Semester 7 - unit *INFO 4 - Option 3*

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Project management 1	5	4.5					*1*
• Long-term industrial project 1	2.5			50		110	*5*
TOTAL	7.5	4.5	0	50	0	110	

Humanities S7 ECTS : 7

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Business analysis	4.5	6				3	*15*
• Quality, security and environmental approaches (QSE1)		3	3				*10*
• Physical education and sport 3		21				2	*10*
• Negotiations	3	7.5				2	*10*
• Professional project 3		6				6	*10*
• Circular economy	4.5	3				6	*10*
• Professional English 3		19	2				*26.25*
1 opt ▷ Continuous Assessment (bis)							*8.75*
1 opt ▷ French as a Foreign Language for engineering students		18					*8.75*
1 opt ▷ Second foreign language - Spanish		18					*8.75*
1 opt ▷ Second foreign language - Japanese		18					*8.75*
1 opt ▷ Second foreign language - Sign language		18					*8.75*
▷ Training for Toeic		18					*8.75*
TOTAL	12	83.5	5	0	0	19	

Interspecialty S7 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 3A Internship Assesment							*1*
1 opt ▷ Entrepreneurship S7				32			*1*
1 opt ▷ Transition Engineering and Interdisciplinarity S7				32			*1*
1 opt ▷ Research S7				32			*1*
▷ Ecological and Societal Transition S7				32			*1*
TOTAL	0	0	0	32	0	0	

Optional - Signal and image ECTS : 5

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Image processing	15	1.5	10.5			23	*2.5*
• Signal processing	5	7.5	9			22.25	*2.5*
TOTAL	20	9	19.5	0	0	45.25	

Common courses - AI and combinatorial algorithmics ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Exploratory data analysis	11.25	4.5	9			16	*1.75*
• Cryptography	6.25	6				13.25	*1*
• Knowledge-based systems project			9			18	*1*
• Introduction to artificial intelligence	10	6				16	*1.25*
TOTAL	27.5	16.5	18	0	0	63.25	

Common courses - Advanced software engineering ECTS : 5

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced software project in C++	2.5			5		15	*1.5*
• Tools for Software Development	2.5		8			0.5	*1*
• Advanced object programming: C ++	13.75	1.5	15			20	*1.5*
• Functional programming	5	5.5	4.5			3	*1*
TOTAL	23.75	7	27.5	5	0	38.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	90.75	120.5	70	87	0	276	30
Face-to-face sum	368.25						

Semester 8 - unit *IDIA4*

Humanités FISA S8 ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Analyse de la pratique FISA S8		4					*0*
• Enjeux de société et entreprise FISA S8		12					*0.4*
• SSAT FISA S8		21					*0.35*
• Corporate culture		15				8	*0.25*
• Conférences d'entreprises		4.5					*0*
TOTAL	0	56.5	0	0	0	8	

Infrastructure et logiciel FISA S8 ECTS : 8

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Dataops et cloud S8 FISA	6	6	8				*1*
• Recherche d'information S8 FISA	6		12				*1*
• Découverte de la recherche FISA S8		25					*2*
• Processus de Business Intelligence S8 FISA	6						*1*
• Methodes et outils devops FISA S8	9		12	8			*2*
TOTAL	27	31	32	8	0	0	

intelligence artificielle ECTS : 10

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Données multimedia S8 FISA	7	7	10				*2*
• Réseaux bayesiens S8 FISA	10	10					*2*
• Réseaux de neurones S8 FISA	8		9				*2*
• Web semantique S8 FISA	7	7	12				*2*
• Questions éthiques et sociétales en informatique S8 FISA	9			10			*1*
TOTAL	41	24	31	10	0	0	

Activité en entreprise S8 ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• activité en entreprise S8 FISA							*1*
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	68	111.5	63	18	0	8	30
Face-to-face sum	260.5						

Semester 8 - unit *INFO 4 - Option 1*

Humanities and Professionnal Issues S8 ECTS : 6

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Critical approaches of the firm		9				3	*13*
• Quality, security ant environmental approaches (QSE2)		6					*13*
• Physical education and sport 4		19.5				2	*13*
• Professional Project 4		12				5	*13*
• Sustainable development and social responsability 2		9				10	*13*
• Intercultural explorations		18					*17.5*
1 opt ▷ Continuous Assessment(bis)							*17.5*
1 opt ▷ Second foreign language - Sign language		18					*17.5*
1 opt ▷ Second foreign language - Spanish		18					*17.5*
1 opt ▷ Second foreign language - Japanese		18					*17.5*
1 opt ▷ Training for Toeic		18					*17.5*
TOTAL	0	91.5	0	0	0	20	

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Discovering scientific research	2.5	3.5				1	*0.5*
• Long-term industrial project 2	7.5			62		124	*5*
• Software testing, integration and delivery	3	1.5	3				*0.5*
TOTAL	13	5	3	62	0	125	

Internship (4th year) ECTS : 5

Manager : NACHOUKI Marie-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Internship (4th year)					400		*5*
TOTAL	0	0	0	0	400	0	

Interspecialty S8 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
1 opt ▷ Entrepreneurship S8				32			*2*
1 opt ▷ Transition Engineering and Interdisciplinarity S8				32			*2*
1 opt ▷ Research S8				32			*2*
1 opt ▷ Ecological and Societal Transition S8				32			*2*
TOTAL	0	0	0	32	0	0	

Common courses - AI-oriented algorithmic ECTS : 4

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Introduction to calculability and complexity theories	5	6				14	*1*
• Software design patterns	7.5	6	13.5			20	*2*
• Problem modelling and combinatorial optimization	11.25	1.5				8	*1*
TOTAL	23.75	13.5	13.5	0	0	42	

Optional - Knowledge ECTS : 4

Manager : GUILLET Fabrice

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Computer-based knowledge engineering	13.75	7.5	9			14.5	*1.5*
• Hyblab project : data, web and interdisciplinarity				23		27	*2*
• Ethical, social and environmental issues in computer science	9						*0.5*
TOTAL	22.75	7.5	9	23	0	41.5	

Optional - Techniques for pattern and model extraction ECTS : 3

Manager : BLANCHARD Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Knowledge discovery in data	13.75	4.5	6			12.5	*1.5*
• Advanced neural networks	8.75	4.5	4.5			15	*1.5*
TOTAL	22.5	9	10.5	0	0	27.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	82	126.5	36	117	400	256	30
Face-to-face sum	361.5						

Semester 8 - unit *INFO 4 - Option 2*

Humanities and Professionnal Issues S8 ECTS : 6

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Critical approaches of the firm		9				3	*13*
• Quality, security ant environmental approaches (QSE2)		6					*13*
• Physical education and sport 4		19.5				2	*13*
• Professional Project 4		12				5	*13*
• Sustainable development and social responsability 2		9				10	*13*
• Intercultural explorations		18					*17.5*
1 opt ▷ Continuous Assessment(bis)							*17.5*
1 opt ▷ Second foreign language - Sign language		18					*17.5*
1 opt ▷ Second foreign language - Spanish		18					*17.5*
1 opt ▷ Second foreign language - Japanese		18					*17.5*
1 opt ▷ Training for Toeic		18					*17.5*
TOTAL	0	91.5	0	0	0	20	

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Discovering scientific research	2.5	3.5				1	*0.5*
• Long-term industrial project 2	7.5			62		124	*5*
• Software testing, integration and delivery	3	1.5	3				*0.5*
TOTAL	13	5	3	62	0	125	

Internship (4th year) ECTS : 5

Manager : NACHOUKI Marie-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Internship (4th year)					400		*5*
TOTAL	0	0	0	0	400	0	

Interspecialty S8 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
1 opt ▷ Entrepreneurship S8				32			*2*
1 opt ▷ Transition Engineering and Interdisciplinarity S8				32			*2*
1 opt ▷ Research S8				32			*2*
1 opt ▷ Ecological and Societal Transition S8				32			*2*
TOTAL	0	0	0	32	0	0	

Common courses - AI-oriented algorithmic ECTS : 4

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Introduction to calculability and complexity theories	5	6				14	*1*
• Software design patterns	7.5	6	13.5			20	*2*
• Problem modelling and combinatorial optimization	11.25	1.5				8	*1*
TOTAL	23.75	13.5	13.5	0	0	42	

Optional - Advanced computer networks and operating systems ECTS : 3

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Cloud computing/DevOps	2.5	1.5	3				*0.5*
• Computer networks and security	11.25	3		9		23	*1.5*
• Transaction processing	6.5	4	3			19	*1*
TOTAL	20.25	8.5	6	9	0	42	

Optional - Applied machine learning techniques ECTS : 4

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multimedia machine learning and coding	11.25	1.5	12	9		20	*2*
• iCreate : Interdisciplinarity, CREAtion, TEchnology				23		27	*2*
TOTAL	11.25	1.5	12	32	0	47	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	68.25	120	34.5	135	400	276	30
Face-to-face sum	357.75						

Semester 8 - unit *INFO 4 - Option 3*

Humanities and Professionnal Issues S8 ECTS : 6

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Critical approaches of the firm		9				3	*13*
• Quality, security ant environmental approaches (QSE2)		6					*13*
• Physical education and sport 4		19.5				2	*13*
• Professional Project 4		12				5	*13*
• Sustainable development and social responsability 2		9				10	*13*
• Intercultural explorations		18					*17.5*
1 opt ▷ Continuous Assessment(bis)							*17.5*
1 opt ▷ Second foreign language - Sign language		18					*17.5*
1 opt ▷ Second foreign language - Spanish		18					*17.5*
1 opt ▷ Second foreign language - Japanese		18					*17.5*
1 opt ▷ Training for Toeic		18					*17.5*
TOTAL	0	91.5	0	0	0	20	

Long-term industrial project and project management 2 ECTS : 6

Manager : GUEDON Jean-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Discovering scientific research	2.5	3.5				1	*0.5*
• Long-term industrial project 2	7.5			62		124	*5*
• Software testing, integration and delivery	3	1.5	3				*0.5*
TOTAL	13	5	3	62	0	125	

Internship (4th year) ECTS : 5

Manager : NACHOUKI Marie-Pierre

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Internship (4th year)					400		*5*
TOTAL	0	0	0	0	400	0	

Interspecialty S8 ECTS : 2

Manager : AUVITY Bruno

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
1 opt ▷ Entrepreneurship S8				32			*2*
1 opt ▷ Transition Engineering and Interdisciplinarity S8				32			*2*
1 opt ▷ Research S8				32			*2*
1 opt ▷ Ecological and Societal Transition S8				32			*2*
TOTAL	0	0	0	32	0	0	

Common courses - AI-oriented algorithmic ECTS : 4

Manager : COHEN Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Introduction to calculability and complexity theories	5	6				14	*1*
• Software design patterns	7.5	6	13.5			20	*2*
• Problem modelling and combinatorial optimization	11.25	1.5				8	*1*
TOTAL	23.75	13.5	13.5	0	0	42	

Optional - Multimedia ECTS : 4

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multimedia	12.5	1.5	9			16	*1.5*
• Hyblab project : data, web and interdisciplinarity				23		27	*2*
• Ethical, social and environmental issues in computer science	9						*0.5*
TOTAL	21.5	1.5	9	23	0	43	

Optional - Machine learning techniques ECTS : 3

Manager : LERAY Philippe

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Reinforcement learning	6.25	9				16	*1*
• Advanced neural networks	8.75	4.5	4.5			15	*1*
• Probabilistic reasoning systems	10	7.5				15	*1*
TOTAL	25	21	4.5	0	0	46	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	83.25	132.5	30	117	400	276	30
Face-to-face sum	362.75						

Semester 9 - unit *Disrupt Campus Nantes*

Users and interactions

ECTS : 5

Manager : VIGIER Toinon

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• conversational agents	1.25		9			8	*1*
• Personal data	10	1	6			12	*1*
• New interactions	5	1	6			6	*1*
• Information visualization	3.75	1	6.75			6	*1*
TOTAL	20	3	27.75	0	0	32	

Prediction and decision

ECTS : 5

Manager : BLANCHARD Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multicriteria Decision Analysis	8.75	6				10	*3*
• Predictive analysis	7.5	3	7.5			10	*2.5*
• Data mining project	2.5		4.5			15	*2*
• Game theory	8.75	1.5				4	*2*
TOTAL	27.5	10.5	12	0	0	39	

Computer Networks

ECTS : 5

Manager : PARREIN Benoit

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Architecture, supervision and network management	6		4			8	*1*
• Internet of Things	3	1.5	5			6	*1*
• Internet multimedia	3	1	8			6	*1*
• Core and Access Networks	6	1.5	11			6	*1*
TOTAL	18	4	28	0	0	26	

Cyber security and privacy

ECTS : 5

Manager : LEHN Rémi

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Security policies	10	0.5				6	*1*
• Offensive Security and Penetration Testing	2.5	0.5	6			6	*1*
• Network Application Security Policy		0.5	9.5			6	*1*
• Data Security and Privacy on the Internet	2.5	0.5	4.5			4	*1*
• Data Privacy / Hardware Security	7.5	1	6			8	*1*
TOTAL	22.5	3	26	0	0	30	

Document analysis ECTS : 5

Manager : PICAROUGNE Fabien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Enterprise content management	3.75	0.25	6				*1*
• Advanced indexation	9	1.5				5	*1*
• Project : Document analysis				9.5			*1*
• Neuronal methods	2.5	4	1.5			10	*1*
• Textual information retrieval	7.5	6				10	*1*
TOTAL	22.75	11.75	7.5	9.5	0	25	

Architecture and administration of advanced information systems ECTS : 5

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• System and cloud administration	3		12			13	*1*
• Web services and interoperability	7.5	1	6			6	*1*
• Distributed and Cooperative Systems	10	1.5				6	*1*
• Virtualization	2.5	1	6			4	*1*
TOTAL	23	3.5	24	0	0	29	

Advanced databases ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Spatial and temporal databases	5	1	3			3	*1*
• Structured documents and NoSQL	10	1.5	9			8	*1*
• Temporal data	5	1	6			6	*1*
• Data quality	5	1	4.5			8	*1*
TOTAL	25	4.5	22.5	0	0	25	

Unstructured data and semantics ECTS : 5

Manager : GUILLET Fabrice

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Semantic web	6	6.5	7.5			9	*1*
• Natural language processing	10	1.5	8.5			8	*1*
• Web semantic application and experiences	1.25		9			11	*1*
TOTAL	17.25	8	25	0	0	28	

Inter-university diploma

ECTS : 15

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 4th year internship evaluation		0.5				20	*10*
• Disrupt Campus Nantes	3	43.5		150		42	*90*
TOTAL	3	44	0	150	0	62	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	179	92.25	172.75	159.5	0	296	55
Face-to-face sum	603.5						

Semester 9 - unit *IDIA5*

UE gestion de données FISA5 — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Structured documents and NoSQL	10	1.5	9			8	*1*
• Temporal data	5	1	6			6	*1*
• Data quality	5	1	4.5			8	*1*
TOTAL	20	3.5	19.5	0	0	22	

Prédiction et décision FISA5 — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multicriteria Decision Analysis	8.75	6				10	*1*
• Predictive analysis	7.5	3	7.5			10	*1*
• Game theory	8.75	1.5				4	*1*
TOTAL	25	10.5	7.5	0	0	24	

Utilisateurs FISA5 — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Personal data	10	1	6			12	*1*
• Visualisation d'information IDIA5	5	5		3			*1*
TOTAL	15	6	6	3	0	12	

Projet R&D FISA5 — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Projet R&D FISA5				100			*1*
TOTAL	0	0	0	100	0	0	

Humanités S9 FISA — ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Conférences d'entreprises		4.5					*0*
• SSAT S9 FISA		28					*0.3*
• Business management - negotiation		36					*0.4*
• Quality Security Environment		20					*0.3*
TOTAL	0	88.5	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	60	108.5	33	103	0	58	30
Face-to-face sum	304.5						

Semester 9 - unit *INFO 5*

Humanities S9 — ECTS : 4

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Designing the tomorrow's management	3	6				3	*30*
• Project management 2		15				3	*35*
• People and team management		10.5				6	*30*
• Professional project 5		12				2	*5*
TOTAL	3	43.5	0	0	0	14	

Users and interactions — ECTS : 5

Manager : VIGIER Toinon

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• conversational agents	1.25		9			8	*1*
• Personal data	10	1	6			12	*1*
• New interactions	5	1	6			6	*1*
• Information visualization	3.75	1	6.75			6	*1*
TOTAL	20	3	27.75	0	0	32	

R&D project — ECTS : 11

Manager : MARTINEZ José

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Research and Development Project				150		30	*90*
• 4th year internship evaluation		0.5				20	*10*
TOTAL	0	0.5	0	150	0	50	

Prediction and decision — ECTS : 5

Manager : BLANCHARD Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multicriteria Decision Analysis	8.75	6				10	*3*
• Predictive analysis	7.5	3	7.5			10	*2.5*
• Data mining project	2.5		4.5			15	*2*
• Game theory	8.75	1.5				4	*2*
TOTAL	27.5	10.5	12	0	0	39	

Computer Networks — ECTS : 5

Manager : PARREIN Benoit

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Architecture, supervision and network management	6		4			8	*1*
• Internet of Things	3	1.5	5			6	*1*
• Internet multimedia	3	1	8			6	*1*
• Core and Access Networks	6	1.5	11			6	*1*
TOTAL	18	4	28	0	0	26	

Cyber security and privacy — ECTS : 5

Manager : LEHN Rémi

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Security policies	10	0.5				6	*1*
• Offensive Security and Penetration Testing	2.5	0.5	6			6	*1*
• Network Application Security Policy		0.5	9.5			6	*1*
• Data Security and Privacy on the Internet	2.5	0.5	4.5			4	*1*
• Data Privacy / Hardware Security	7.5	1	6			8	*1*
TOTAL	22.5	3	26	0	0	30	

Document analysis — ECTS : 5

Manager : PICAROUGNE Fabien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Enterprise content management	3.75	0.25	6				*1*
• Advanced indexation	9	1.5				5	*1*
• Project : Document analysis				9.5			*1*
• Neuronal methods	2.5	4	1.5			10	*1*
• Textual information retrieval	7.5	6				10	*1*
TOTAL	22.75	11.75	7.5	9.5	0	25	

Architecture and administration of advanced information systems — ECTS : 5

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• System and cloud administration	3		12			13	*1*
• Web services and interoperability	7.5	1	6			6	*1*
• Distributed and Cooperative Systems	10	1.5				6	*1*
• Virtualization	2.5	1	6			4	*1*
TOTAL	23	3.5	24	0	0	29	

Advanced databases — ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Spatial and temporal databases	5	1	3			3	*1*
• Structured documents and NoSQL	10	1.5	9			8	*1*
• Temporal data	5	1	6			6	*1*
• Data quality	5	1	4.5			8	*1*
TOTAL	25	4.5	22.5	0	0	25	

Unstructured data and semantics — ECTS : 5

Manager : GUILLET Fabrice

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Semantic web	6	6.5	7.5			9	*1*
• Natural language processing	10	1.5	8.5			8	*1*
• Web semantic application and experiences	1.25		9			11	*1*
TOTAL	17.25	8	25	0	0	28	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	179	92.25	172.75	159.5	0	298	55
Face-to-face sum	603.5						

Semester 9 - unit *INFO 5 - Contrat de professionnalisation*

Humanities S9 ECTS : 4

Manager : GREVIN Anouk

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Designing the tomorrow's management	3	6				3	*30*
• Project management 2		15				3	*35*
• People and team management		10.5				6	*30*
• Professional project 5		12				2	*5*
TOTAL	3	43.5	0	0	0	14	

Company-related work - Professional training contract ECTS : 4

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Expressing work and competences from company-related work				10	300		*1*
TOTAL	0	0	0	10	300	0	

R&D project - Professional training contract ECTS : 7

Manager : MARTINEZ José

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Research and Development Project - Professional training contract				120		24	*85*
• 4th year internship evaluation		0.5				20	*15*
TOTAL	0	0.5	0	120	0	44	

Advanced databases - Professional training contract ECTS : 5

Manager : RASCHIA Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Structured documents and NoSQL	10	1.5	9			8	*1*
• Temporal data	5	1	6			6	*1*
• Data quality	5	1	4.5			8	*1*
TOTAL	20	3.5	19.5	0	0	22	

Computer Networks - Professional training contract ECTS : 5

Manager : PARREIN Benoit

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Architecture, supervision and network management	6		4			8	*1*
• Internet of Things	3	1.5	5			6	*1*
• Core and Access Networks	6	1.5	11			6	*1*
TOTAL	15	3	20	0	0	20	

Prediction and decision - Professional training contract ECTS : 5

Manager : BLANCHARD Julien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Multicriteria Decision Analysis	8.75	6				10	*3*
• Predictive analysis	7.5	3	7.5			10	*2.5*
• Game theory	8.75	1.5				4	*2*
TOTAL	25	10.5	7.5	0	0	24	

Architecture and administration of advanced information systems - Professional training contract ECTS : 5

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• System and cloud administration	3		12			13	*1*
• Web services and interoperability	7.5	1	6			6	*1*
• Virtualization	2.5	1	6			4	*1*
TOTAL	13	2	24	0	0	23	

Document analysis - Professional training contract ECTS : 5

Manager : PICAROUGNE Fabien

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced indexation	9	1.5				5	*1*
• Project : Document analysis				9.5			*1*
• Neuronal methods	2.5	4	1.5			10	*1*
• Textual information retrieval	7.5	6				10	*1*
TOTAL	19	11.5	1.5	9.5	0	25	

Cyber security and privacy - Professional training contract ECTS : 5

Manager : LEHN Rémi

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Security policies	10	0.5				6	*1*
• Offensive Security and Penetration Testing	2.5	0.5	6			6	*1*
• Network Application Security Policy		0.5	9.5			6	*1*
• Data Privacy / Hardware Security	7.5	1	6			8	*1*
TOTAL	20	2.5	21.5	0	0	26	

Unstructured data and semantics - Professional training contract ECTS : 5

Manager : GUILLET Fabrice

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Semantic web	6	6.5	7.5			9	*1*
• Natural language processing	10	1.5	8.5			8	*1*
TOTAL	16	8	16	0	0	17	

Users and interactions - Professional training contract ECTS : 5

Manager : VIGIER Toinon

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• conversational agents	1.25		9			8	*1*
• Personal data	10	1	6			12	*1*
• Information visualization	3.75	1	6.75			6	*1*
TOTAL	15	2	21.75	0	0	26	

Collaborative and interdisciplinary project - Professional training contract ECTS : 7

Manager : PIGEAU Antoine

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 4th year internship evaluation		0.5				20	*10*
1 opt { ▷ Design Factory - Professional training contract				120		24	*90*
1 opt { ▷ Entrepeneurship - Professional training contract				120		24	*90*
TOTAL	0	0.5	0	120	0	44	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	146	87.5	131.75	259.5	300	285	62
Face-to-face sum	624.75						

Semester 10 - unit *IDIA-S10*

UE Entreprise

ECTS : 20

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Travail en entreprise FISA S10							*1*
• Rédaction et soutenance PFE		12					*1*
TOTAL	0	12	0	0	0	0	

UE Humanité S10 FISA

ECTS : 4

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• SSAT S10 FISA		28					*0.8*
• Business law and economic intelligence		21					*0.2*
TOTAL	0	49	0	0	0	0	

Exploitation des données S10 FISA

ECTS : 6

Manager : GELGON Marc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Données spatiales S10 FISA	6		6				*1*
• Données en flux S10 FISA	3		3				*1*
TOTAL	9	0	9	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	9	61	9	0	0	0	30
Face-to-face sum	79						

Semester 10 - unit *INFO 5 - S10 - CONTRAT PRO*

Contrat pro - S10

ECTS : 28

Manager : NORMAND Nicolas

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Contrat pro - S10							*1*
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	0	0	0	0	0	0	28
Face-to-face sum							

Semester 10 - unit
INFO5-S10-NON-CONTRATS PRO

Stages de fin d'études

ECTS : 30

Manager : NORMAND Nicolas

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Final Project					750		*1*
TOTAL	0	0	0	0	750	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	0	0	0	0	750	0	30
Face-to-face sum							

Part II

Sheets of courses

3A Internship Assesment

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *Rapport*

Manager : Bruno AUVITY

3rd year internship

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *Evaluation du stage*

Manager : Marie-Pierre NACHOUKI

4th year internship evaluation

Hours

Lect	Tut	PW	Proj	WP	Asst
	0.5				20

Evaluation

One evaluation : *Pratique*

Manager : Marie-Pierre NACHOUKI

Accounting business game + Biodiversity fresco

Hours

Lect	Tut	PW	Proj	WP	Asst
	35				

Evaluation

One evaluation : *Oral*

Manager : Chrystèle GONCALVES

Activité apprentis en entreprise FISA S5

Hours

Lect	Tut	PW	Proj	WP	Asst
					150

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Activité en entreprise FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
					150

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Activité en entreprise S7 FISA

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *pratique*

Manager : Marc GELGON

Advanced indexation

Hours

Lect	Tut	PW	Proj	WP	Asst
9	1.5				5

Evaluation

One evaluation : *Théorie*

Outline

1.Temporal Database
- Introduction on temporal DB
- Temporal DB model
- Temporal query
- Temporal index

2.Pattern Mining

3.Process Mining
- Process mining introduction
- Alpha Algorithm
- Heuristic Miner Algorithm
- Conformance checking

Bibliography

C. Claramunt and M. Theriault
Managing Time in GIS: An Event-Oriented Approach.
Proceedings of the International Workshop on Temporal Databases: Recent Advances in Temporal Databases, 1995.
C. H. Mooney and J. F. Roddick
Sequential pattern mining - approaches and algorithms
ACM Computing Surveys, vol. 45(2), pp. 1-39, 2013.
C. S. Jensen , R. T. Snodgrass , M. D. Soo
The TSQL2 Data Model.
The Springer International Series in Engineering and Computer Science, Vol. 330
C. E. Atay
A Comparison of Attribute and Tuple Time Stamped Bitemporal Relational Data Models.
Proceedings of the International Conference on Applied Computer Science, 2010.
P. Fournier-Viger, J. C.-W. Lin, R. U. Kiran, Y. S. Koh, R. Thomas
A Survey of Sequential Pattern Mining
Data Science and Pattern Recognition, vol. 1(1), pp. 54-77, 2017.
W. M.P. van der Aalst
Process Mining, Discovery, Conformance and Enhancement of Business Processes.
Springer, 2011.

Manager : José MARTINEZ

Advanced neural networks

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	4.5	4.5			15

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Marc GELGON

Advanced object programming: C ++

Hours

Lect	Tut	PW	Proj	WP	Asst
13.75	1.5	15			20

Evaluation

One evaluation : *Examen*

Outline

- Fundamentals of language
  - From structure to the object
  - Operators
  - C++ program structure
  - Inputs / Outputs
  - Exceptions
  - Inheritance, static/dynamic link
  - Casting
  - Templates
  - Standard library

Goals

The paradigm of the object-oriented programming is essential in any modern programming language. The first objective of this course is to study the mechanisms of the object-oriented programming. The second more particularly relates to the training of the modern C++ language (post C++11) and of its standard library.

Bibliography

- Bjarne Stroustrup, The C++ Programming Language, Addison Wesley Longman edts
  - Scott Meyers. 2014. Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14 (1st ed.). O'Reilly Media, Inc.

Prerequisites

- Algorithms
  - C Language
  - Object Modelling

Learning outcomes

Learning outcomes	N	A	M	E	O
• Model a problem with an object oriented approach	·	·	✓	·	·
• Implement an object model in C++	·	·	✓	·	·
• Know how to overload operators	·	·	✓	·	·
• Mastering the mechanism of inheritance in C++	·	·	✓	·	·
• Designing class models	·	✓	·	·	·
• Use the standard library	·	✓	·	·	·

Manager : Fabien PICAROUGNE

Advanced software project in C++

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5			5		15

Evaluation

One evaluation : *Soutenance*

Outline

- Modeling a problem in the object paradigm
  - Implementation in C ++

Goals

Practicing object modeling and implement it in C ++.

Bibliography

- Bjarne Stroustrup, The C++ Programming Language, Addison Wesley Longman edts
  - Scott Meyers. 2014. Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14 (1st ed.). O'Reilly Media, Inc.

Prerequisites

- Advanced object programming: C ++

Learning outcomes

Learning outcomes	N	A	M	E	O
• Modeling a problem as an object model	·	·	✓	·	·
• Propose solutions to implement the model in C ++	·	·	✓	·	·
• Analyse a real-world problem	·	✓	·	·	·

Manager : Fabien PICAROUGNE

Algorithmic competitive project with python

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75		6			20

Evaluation

One evaluation : *Projet*

Presentation

The very first large scale development project in the INFO dpt.

Outline

- Modeling of a problem
  - creation of data structures and algorithmic to solve the problem
  - Implementation in Python

Goals

Practice simple algorithmic modeling and apply it with the Python language.

Prerequisites

Algorithmic

Learning outcomes

Learning outcomes	N	A	M	E	O
• Modeling a problem in the form of an algorithm	·	·	✓	·	·
• Propose appropriate data structures	·	✓	·	·	·

Manager : Guillaume RASCHIA

Algorithmique et structures de données FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
20		20			20

Evaluation

One evaluation : *DS*

Algorithms & programming

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	9	24			30

Evaluation

3 evaluations :

- *Final*
- *Test1*
- *Test2*

Outline

1 Recursion
2 Linked structures
2.1 Linked lists
2.2 Stacks
2.3 Queues
3 Hash-Coding
4 Trees
4.1 Definitions and terminology
4.2 Binary tree
4.2.1 Pre-order, in-order, and post-order traversal
4.2.2 Binary search tree
4.2.3 AVL tree
4.3 (a-b) trees
4.3.1 (2-3-4) trees
4.3.2 B trees
4.3.3 B+ trees
4.4 Clustering tree
5 Graph data structures
6 Programming with deterministic finite automaton
7 External merge sort
7.1 Balanced multuway merging
7.2 Polyphase merge sort
Hands-on programming in python langage :
Recursion (Quicksort, towers of Hanoi, ...)
Stacks and linked lists
Binary search trees
Graphs

Bibliography

Christian CARREZ : "Structure de données en Java, C++ et Ada 95 : Pratique et outils de contrôle", Dunod 2000

Jacques COURTIN et Irène KOVARSKI : "Initiation à l'algorithmique et aux structures de données, volume 1", Dunod 1994

Jacques COURTIN et Irène KOVARSKI : "Initiation à l'algorithmique et aux structures de données, tome 2", Dunod 1997

D.E. KNUTH : "The art of computer programming : sorting and searching", Addison-Wesley 1973

Christine FROIDEVAUX, Marie-Claude GAUDEL, Michèle SORIA : "Types de données et algorithmes", Ediscience 1993

Prerequisites

Preliminaries algorithmis & programming

Learning outcomes

Learning outcomes	N	A	M	E	O
• Ability to rise the question of algorithm time complexity and distinguish it from computation time	·	✓	·	·	·
• Characterize the complexity of algorithms based on simple data structures	✓	·	·	·	·
• Ability to design algorithms and select suitable data structures on which these algorithms rely.	·	·	✓	·	·
• Implement algorithms with the python language.	·	·	✓	·	·

Manager : Philippe PETER

Algèbre linéaire FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7	8				

Evaluation

One evaluation : *Evaluation*

Analyse de données et apprentissage S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	4.5	9	3		

Evaluation

2 evaluations :

- *théorie*
- *pratique*

Manager : Marc GELGON

Analyse de la pratique

Hours

Lect	Tut	PW	Proj	WP	Asst
	2				

Evaluation

One evaluation : *Evaluation*

Analyse de la pratique FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
	4				

Evaluation

One evaluation : *Evaluation*

Architecture, supervision and network management

Hours

Lect	Tut	PW	Proj	WP	Asst
6		4			8

Evaluation

One evaluation : *Théorie*

Outline

It describes the implementation constraints of a network using a layered model for services (cloud) to the material:

- Deepening of the protocol stack TCP / IP hybrid networks reminder functions, application
- Study design and necessary means of achieving
- Study of the required quality of service and election processes for making
- Study of network availability and choice of implementation
- Study of information security through the application and the network
- Summary of constraints and proposed methodologies for achieving

Labs : Dynamic Routing with OSPF

Goals

This course synthesizes different learning seen in previous years in the field of networks with two main objectives:

Being able to understand the design of services carried by an IP network infrastructure through its various components.

Being able to conduct a full audit of IP infrastructure supporting services.

Bibliography

L'Architecture des réseaux IP (Hervé BRIAND)

Computer Networks, Andrew Tanenbaum

Prerequisites

Mastery of basic IPv4 networks, IPv6

Knowledge of network elements involved in the security infrastructure

Knowledge of the service quality, concepts of IP / MPLS

Knowledge of the OSI model

Learning outcomes

Learning outcomes	N	A	M	E	O
• Analyzing network specifications of the client, classify it related to the constraints of protocols, dimensioning, QoS, availability, security and architecture	·	·	✓	·	·
• To be able to go one step beyond the explicit propositions in order to define implicit one to answer to the question	✓	·	·	·	·
• To define architectural answers thanks to a network toolbox	·	✓	·	·	·

Manager : Benoit PARREIN

Automates et probabilités FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
10	10				10

Evaluation

One evaluation : *DS*

Manager : Marc GELGON

Business analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5	6				3

Evaluation

One evaluation : *Etude de cas*

Bibliography

- A de Baynast, J Lendrevie, J Levy; Mercator"; Dunod. Dernières éditions
- F Canart ; Management de la qualité ; Gualino L Extenso Editions
- Henri Mintzberg, Structure et dynamique des organisations (Éd. d'organisation)
- M.Crozier ; A quoi sert la sociologie des organisations (Éd. Seli Arslan)
- S. Robbins, D. DeCenzo, M. Coulter ; Management, l'essentiel des concepts et des pratiques (9ème éd) Ed. Pearson
- https://www.l-expert-comptable.com/dossiers/evaluer-l-entreprise-reprendre-grace-l-analyse-economique.html
- https://www.fao.org/capacity-development/resources/practical-tools/analyse-organizational-performance/fr/

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-4	✓	·	·	·	·

Manager : Gwenael THOREL

Business economy

Hours

Lect	Tut	PW	Proj	WP	Asst
	16				

Evaluation

One evaluation : *Devoir sur table*

Manager : Chrystèle GONCALVES

Business knowledge and entrepreneurship

Hours

Lect	Tut	PW	Proj	WP	Asst
3	13.5				4

Evaluation

One evaluation : *Etude de cas*

Bibliography

? Cyr, A. (2009). Les représentations entrepreneuriales, sous la direction de Louis Jacques Filion et Christian Bourion, Paris, Eska, 2008, 262 p. Revue internationale PME Économie et gestion de la petite et moyenne entreprise, 22(3-4), 174-176.

? Henri Mintzberg, Structure et dynamique des organisations (Éd. d'organisation)

? http://www.laurentdehouck.fr/enseignements/histoire-des-idees-sur-les-organisations/

? M. Bidan et Y. Livian (2022), les grands auteurs aux frontières du management (Editions EMS)

? M.Crozier ; A quoi sert la sociologie des organisations (Éd. Seli Arslan)

? Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. Communications of the association for Information Systems, 16(1), 1.

? Ramadani, V. (2009). Business angels: who they really are. Strategic Change: Briefings in Entrepreneurial Finance, 18(7?8), 249-258.

? S. Robbins, D. DeCenzo, M. Coulter ; Management, l'essentiel des concepts et des pratiques Ed. Pearson.

? Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. Academy of management Review, 26(2), 243-263.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Luc OILI

Business law and economic intelligence

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				

Evaluation

One evaluation : *Contrôle continu*

Manager : Gwenael THOREL

Business management - negotiation

Hours

Lect	Tut	PW	Proj	WP	Asst
	36				

Evaluation

One evaluation : *Contrôle continu*

Manager : John KINGSTON

C language

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	1.5	12			12

Evaluation

One evaluation : *Examen*

Outline

1. Fundamentals
   2. Variables, data types
   3. Iuput/Output
   4. Expressions and Operators
   5. Flow control structures
   6. Functions
   7. Structures
   8. Preprocessor
   9. Pointers
   10. Memory operation
   11. Functions 2
   12. Input/Output 2: File Management
   13. Compiler options, use of libraries and debugging
   14. Standard library

Goals

The objective of this course is to learn the basics of programming. From a basic understanding of functional programming in C, we will deepen the inherent mechanisms of the C language and of the memory management of a computer, to prepare students for learning modern programming paradigms.

Bibliography

Brian W. Kernighan et Dennis M. Ritchie, Le Langage C

Prerequisites

- Algorithms

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know how to implement an algorithm in C language	·	·	✓	·	·
• Know to structure the memory of a program	·	·	✓	·	·
• Know how to use the input/output mechanisms of the C language	·	·	✓	·	·
• Know the standard C library	·	✓	·	·	·

Manager : Fabien PICAROUGNE

Circular economy

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5	3				6

Evaluation

One evaluation : *Diagnostic*

Bibliography

- AUREZ Vincent, GEORGEAULT Laurent, Economie circulaire, de Boeck
- Cf bibliographie donnée pendant le cours

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·

Manager : Chrystèle GONCALVES

Classical Logics

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	10.5				18

Evaluation

One evaluation : *Théorie*

Presentation

A practical introduction to classical logics: propositional logic and predicate logics with or without equality. The course emphasizes on reasoning's translation from natural language to logical formalisms and studies several proof methods. A summary on theoretical logic resumes the foundations of formal logic and gives main theoretical results.

Outline

1. Introduction: Notion of logics - Interests of logics
   2. Propositional logic: Proposition - negation, conjunction, disjunction
   Main propositional equivalences
   Translations of statements and arguments in current language
   Validation of arguments represented by logical formulas
   Semantic methods: truth tables, semantic trees ...
   Syntactic methods: resolution method ...
   3. First order predicate logic
   Notion of predicate - Quantifiers - Main logical equivalences
   Transcription of predicative arguments Manipulation of predicative formulas
   Proof methods: semantic tree method - resolution method
   4. Other classical logics: predicates with equality - second order predicates
   5. Elements of theoretical logic: formal syntax, formal deduction, formal semantics.
   Consistency, completeness, decidability

Goals

Logic concept is the root of a number of compter science paradigms : relational data management languages, satisfaction problems, model-checking.

Upon completion, the students will modelize and formalize in a logical way some practical problems. They will also be able to manipulate, prove the validity of formulas written in the two main used logics: propositional logic and first-order logic.

Bibliography

BEN-ARI M. ; « Mathematical Logic for Computer Science » ; Prentice-Hall, 1993
JASON G. ; « Introduction to Logic » ; Jones and Bartlett, 1994
REEVES S., CLARKE M. ; « Logic for Computer Science » ; Addison Wesley, 1990
RUBIN J. E. ; « Mathematical Logic: Applications and Theory » ; Saunders College Publishing, 1990

Prerequisites

No prerequisite

Manager : Hoël LE CAPITAINE

Cloud computing/DevOps

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	1.5	3			10

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Cloud computing/DevOps

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	1.5	3			

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Computer and operating systems 1

Hours

Lect	Tut	PW	Proj	WP	Asst
5	1.5	18			10

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1. Harware architecture of computers
2. Software architecture of computers: operating systems
3. Management of processus
4. Memory management
5. History of computers
6. Initiation to Unix

Goals

To understand the architecture of a computer : basic concepts, components and functions of a computer in term of hardware and software (operating system). Application to unix system during the labs.

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the components of a computers and their interactions	·	✓	·	·	·
• To understand the functions and the structure of an operating system	·	✓	·	·	·
• To know the mecanisms of process and memory management	·	·	✓	·	·
• To use the basic user commands in Unix	·	·	✓	·	·
• To use the advanced features in unix (find, regexp, redirections, process management, shell scripting,...)	·	·	✓	·	·
• coding with basic function of unix API in C	·	·	✓	·	·

Manager : Fabrice GUILLET

Computer networks 2 - Protocol design

Hours

Lect	Tut	PW	Proj	WP	Asst
	9	9			12

Evaluation

One evaluation : *Pratique*

Presentation

Students are led to design a protocol stack in order to exchange between network entities. Different types of architectures and service levels are used (ring, packet, layers, multiplexing, connected mode, unconnected mode).

Outline

Work in groups (3 to 4 students per group):

1- Specification: design of the protocols
2- Internet programming in labs
3- Realization of a mini-project

Goals

To design a protocol stack in order to communicate through the network, with different types of architectures and levels of service.

Prerequisites

Networks 1

Programming (C and Python)

Learning outcomes

Learning outcomes	N	A	M	E	O
• To specify a network protocol with layers.	·	·	✓	·	·
• To know how to program of a network protocol (Internet programming).	·	✓	·	·	·

Manager : Vincent RICORDEL

Computer networks 3

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5	12			17.5

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Internet history
Global view
Link protocols : ethernet, PPP, ARP
Network protocols : IPv4, IPv6
Transport protocols : UDP, TCP
Self-configuration and naming : stateless configuration (IPv6), DHCP, DNS, LDAP
Application protocols : HTTP, SMB, CIFS

Goals

Discovering the architecture and the protocols of Internet

Bibliography

Guy Pujolle, « Les réseaux », Eyrolles, 2008

Laurent Toutain, « Réseaux locaux et Internet, des protocoles à l'interconnexion », Hermes, 2003

Charles Spurgeon, « Charles Spurgeon's Ethernet Web Site », http://wwwhost.ots.utexas.edu/ethernet

Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts, Stephen Wolff, « A Brief History of the Internet », http://www.isoc.org/internet/history/brief.html

Prerequisites

Computer basics (information coding)

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understanding the Internet functionning	·	·	✓	·	·
• Designing a local network architecture	·	✓	·	·	·
• Interconnecting local networks	·	·	✓	·	·
• Connecting local networks to the Internet	·	·	✓	·	·
• Deploying Internet applications	·	✓	·	·	·

Manager : Rémi LEHN

Computer networks and security

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	3		9		23

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

This course is centered on the mini-project that focuses on the broad theme of networks. It is to be completed in binoms using largely homework. On the organizational point of view, it is the mini-application of the methodology for the project acquired in 4th year with a bibliographical phase, design and implementation. Magistral courses introduce topics not covered previously in training (access networks, wireless networks and quality of service).

Outline

* Physical layer and access
  * Access Networks
  * Wifi networks and ad-hoc
  * Quality of Service (definitions and implementations)
  * P2P Networks

  Mini-project
  * presentation and selection of the subject
  * bibliography and requirements (within 4 pages)
  * demo

Goals

To like computer networks

To start news topics not covered (or partly covered) in lecture

To prepare to the 5th year (RSC courses)

Bibliography

Laurent Toutain, Réseaux Locaux et Internet, Hermès, 2003 , 844 p. ISBN 2-7462-0670-6

Prerequisites

Networks notion (of S5), Networks, Cryptography

Learning outcomes

Learning outcomes	N	A	M	E	O
• Starting some new problems initiated in lectures in a project	·	✓	·	·	·
• Driving a project with deliverables, realisation and demonstration	·	·	✓	·	·
• Understanding quality of service in a local and wide area network	·	·	✓	·	·
• Caracterizing and scheduling a traffic	·	·	✓	·	·
• Understanding P2P networks	·	·	✓	·	·

Manager : Benoit PARREIN

Computer-based knowledge engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
13.75	7.5	9			14.5

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1. Introduction to Knowledge Management
   Issues and challenges. Typology of knowledge. Corporate memory. Knowledge life cycle. Case Study.
   2. Tools for knowledge management
   Groupware, workflow. Electronic Document Management (EDM). Knowledge mapping.
   3. Knowledge extraction/elicitation
   Practical guide. Advices and feedbacks
   4. conceptual methods
   KADS, MKSM
   5. Knowledge modeling
   Semantic networks. Conceptual graphs. Description logics. XML tools. To ontologies (RDF and OWL). Transposition in prolog.
   6. Case studies
   With XML. With software knowledge management (Atanor)

Goals

The objective is to present knowledge management in the frame of knowledge modeling in computer sciences

Bibliography

Ermine J.-L. ; Les systèmes de connaissances ; Hermès, 1996

Zacklad M., Grundstein M. (Ed.) ; Ingénierie des connaissances et capitalisation des connaissances ; Hermès, 2001

Schreiber G., et al. ; Knowledge Engineering and Management : The CommonKADS methodology ; MIT Press, 1999

Manager : Fabrice GUILLET

Conception des systèmes d'information FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7	7	6			

Evaluation

One evaluation : *Evaluation*

Concurrency in algorithms

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	4.5	6			11

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

This course introduces the issues of competition due to parallelism of processes on a computer. Then presents the solutions available through the mechanisms of competition management and synchronization available, either in systems or in programming languages.

Outline

C1: process and threads
C2: Competition and Mutual Exclusion
C3: solutions with active waiting loop
C4: semaphores and monitors (Petri nets)
C5: producers / consumers
TD1: mutual exclusion, dead lock,
producers / consumers (semaphores)
TD2: producers / consumers (monitors)
TP1: coding TD1 in Python (semaphores)
TP2: coding TD2 in Python (monitors)

Goals

Understand competition mechanisms / process competition on common resources.
Master the notion of heavy and light process (thread)
Master the notions of critical resource, critical section, mutual exclusion, synchronization.
Master the concepts of semaphores and monitors.
Knowing how to use the Petri nets to model a competition problem and solve it.
Solve the problems of mutual exclusion, fatal embrace, alternation, producers / consumers.
Apply by coding these mechanisms on threads in Python language.

Prerequisites

Basics of computer architecture (process and program execution, finite state machines)
Basics of graph theory
Python language

Manager : Fabrice GUILLET

Consolidation in linear algebra and calculus

Hours

Lect	Tut	PW	Proj	WP	Asst
13.75					10

Evaluation

One evaluation : *contrôle*

Outline

vector spaces
- linear applications
- matrix calculations
- distances, norms, scalar product
- example applications that require linear algebra
- a few informal examples about computational complexity
- integration
- derivation
- complex numbers
- a few words and examples about computer environments for maths (R,matlab,python)

Goals

In this topic, we cover fundamental concepts in linear algebra and calculus, that we estimate necessary for a computer science curriculum. We take care to relate these topics to computer science (both why these maths are useful and how computer can make these mathematical calculations).

Learning outcomes

Learning outcomes	N	A	M	E	O
• Ability to model and formalize simple real problems in mathematical terms, with variables, linear algebra and/or calculus.	·	✓	·	·	·
• Ability to make common calculation (by hand, not with a computer)	·	✓	·	·	·
• Be aware of the tight between computer science (modelling aspects, computing aspects)	·	✓	·	·	·

Manager : Marc GELGON

Continuous Assessment (bis)

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *CC*

Continuous Assessment(bis)

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *CC*

Contrat pro - S10

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *pratique*

Manager : Nicolas NORMAND

Core and Access Networks

Hours

Lect	Tut	PW	Proj	WP	Asst
6	1.5	11			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Metro-Ethernet (Louis Legouriellec, Alcatel-Lucent/Fizians)

1. What & Why? Opportunity for Carrier Metro Ethernet Services
2. How? Implementation of Metro Ethernet connectivity services
3. How? The OSS aspect
4. How? Example of equipment architecture
5. Technology evolution

MPLS
Introduction, terminology, components, labels allocation and distribution, AtoM, MPLS VPN
MPLS Lab

Goals

Understand provider networks like core and access networks

Bibliography

Protocole MPLS, Adrien Genillier, Supports de cours, Polytech Nantes

Prerequisites

Networks architecture

Manager : Benoit PARREIN

Corporate culture

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				8

Evaluation

2 evaluations :

- *CC*
- *DS*

Corporate culture

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				16

Evaluation

2 evaluations :

- *CC*
- *DS*

Critical approaches of the firm

Hours

Lect	Tut	PW	Proj	WP	Asst
	9				3

Evaluation

One evaluation : *Exposé*

Bibliography

- Carney, B. M., & Getz, I. (2016). Freedom, Inc: How Corporate Liberation Unleashes Employee Potential and Business Performance. International Creative Management.

- Detchessahar, M. (2019). L'entreprise délibérée: refonder le management par le dialogue. Nouvelle cité.

- Dujarier, M.-A. (2017). Le management désincarné: enquête sur les nouveaux cadres du travail. La découverte.

- Gomez, P.-Y. (2013). Le travail invisible: enquête sur une disparition. Paris: F. Bourin.

- Les statuts juridiques de l'entreprise (Dessine-moi l'éco)

- Rendre le travail visible : la solution pour sortir de la crise (Dessine moi l'éco)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Roland BESSENAY

Cryptography

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	6				13.25

Evaluation

One evaluation : *Devoir surveillé*

Presentation

Applied cryptography introduction

Outline

1. Ciphering history
   2. Ciphering by secret key - DES protocol
   3. Ciphering by public key - RSA algorithm
   4. Authentication and digital signature
   5. Secure communication
   6. Notion of PKI infrastructure
   7. Blockchain introduction

Goals

This course aims to give necessary theoretical skills to understand security protocols and algorithms.

Bibliography

Bruce Schneier, Cryptographie appliquée, Wiley, 2001, 846 p.

Prerequisites

Information theory

Learning outcomes

Learning outcomes	N	A	M	E	O
• Describing a symmetric ciphering algorithm (currently used)	·	·	✓	·	·
• Describing a asymmetric ciphering algorithm (currently used)	·	·	✓	·	·
• Understanding private/public keys mechanism	·	·	✓	·	·
• Modular arithmetic (inverse function, exponent function)	·	·	✓	·	·
• Proposing elementary secured protocols	·	✓	·	·	·

Manager : Benoit PARREIN

Data Privacy / Hardware Security

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	1	6			8

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Rémi LEHN

Data Security and Privacy on the Internet

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	0.5	4.5			4

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Rémi LEHN

Data mining project

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5		4.5			15

Evaluation

One evaluation : *Pratique (projet)*

Goals

Implement a data warehouse architecture, the extraction processes, and the exploration and analysis processes.

Prerequisites

Databases
- Database and Datawarehouse Design
- Data mining

Manager : Julien BLANCHARD

Data parallelism

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	1.5	3			2

Evaluation

One evaluation : *Théorie*

Outline

Introduction
- Data parallelism, and hybrid parallelism
- Elements of parallel algorithmics

Goals

We are interested in the efficient processing of huge datasets. Data parallelism is the key to success. In practice, one can find it in various functional approaches, including... SQL.

Bibliography

Cormen T., Leiserson C., Rivest R. ; Introduction à l'algorithmique ; Dunod
Cosnard M., Trystram D. ; Algorithmes et architectures parallèles ; InterÉditions

Prerequisites

Algorithmics; C Programming Language

Learning outcomes

Learning outcomes	N	A	M	E	O
• Write down data parallel algorithms	·	·	✓	·	·
• Evaluate the time and surface complexities	·	·	✓	·	·
• Write down parallel recursive algorithms	·	·	✓	·	·

Manager : José MARTINEZ

Data quality

Hours

Lect	Tut	PW	Proj	WP	Asst
5	1	4.5			8

Evaluation

2 evaluations :

- *DS*
- *TP*

Manager : Guillaume RASCHIA

Data visualization

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5	1.5	7.5			15

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1- Introduction
2- Data representations : basic techniques
3- Trees and networks : static layouts, dynamic layouts and large graphs
4- Metrics : isometrical embeddings and approximations
5- Virtual reality and metaphors
6- 3D representations

Goals

Presentation of various aspects of visualization in the field of knowledge extraction. Visual data mining is appropriate for discovering structures (e.g. clusters, bumps, trends, associations). The course develops basic techniques specially adapted to different types of data (e.g. Graphs, metric spaces) and discusses their limits for very large data sets. Recent strategies including human-centered approaches and 3D supports are also presented to tackle high dimensional data.

Bibliography

Fayyad U. , Grinstein G.G., Wierse A. (2002). Information visualization in data mining and knowledge discovery, Morgan Kaufman Pub. - Telea A. (2007). Data visualization : Principles and practice, A.K. Peters Ldt - Ware C. (2000). Information visualization - Perception for design, Morgan Kaufman Pub.

Prerequisites

Data analysis - Graph theory

Manager : Pascale KUNTZ-COSPEREC

Database query processing

Hours

Lect	Tut	PW	Proj	WP	Asst
5	7	3			15

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Guillaume RASCHIA

Dataops et cloud S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
6	6	8			

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

Design Factory - Professional training contract

Hours

Lect	Tut	PW	Proj	WP	Asst
			120		24

Evaluation

One evaluation : *Pratique*

Manager : Toinon VIGIER

Design of databases and data warehouses

Hours

Lect	Tut	PW	Proj	WP	Asst
10	3	12			14.5

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Pratique*

Outline

Data warehouse overview
Extract, Transform and Load
Data administration
Build normalized and multi-dimensional models
Fundamentals of data warehousing
Data Warehouse Systems Architecture and Optimization,
Data warehouse project planning

Goals

The main objective of this course is to introduce the general architecture of the data warehouses by focusing more particularly on the user point of view. The student will use a reporting tool from a predefined modelling.

Bibliography

Ramakrishnan R., et al. ; Database management systems ; McGraw-Hill, 2003
Jarke J., et al. ; Fundamentals of data warehouses ; Springer, 2002
Akoka J., et al. ; Entrepôts de données et bds multidimensionnelles ; Hermès Lavoisier,2002
Adelman S., et al. ; Data warehouse project management ; Addison Wesley, 2004

Manager : Guillaume RASCHIA

Designing the tomorrow's management

Hours

Lect	Tut	PW	Proj	WP	Asst
3	6				3

Evaluation

One evaluation : *Grille d'évaluation*

Bibliography

Partie don :

L'entreprise une affaire de don (Collectif, 2016)

Recevoir pour donner (Collectif, 2016)

Partie Jeux sérieux :

Theory of Fun for Game Design, Raph Koster, O'Reilly Media; Second edition, ISBN ? 978-1449363215

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	·	✓	·	·
• TPN-2	·	·	✓	·	·
• TPN-3	·	·	✓	·	·
• TPN-4	·	·	✓	·	·
• TPN-5	·	·	✓	·	·

Manager : Roland BESSENAY

Discovering scientific research

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	3.5				1

Evaluation

One evaluation : *Contrôle sur table*

Presentation

The research teams composing most of the pedagogical forces of the INFO department present their research. This leads to team laboratory visits by engineering students to discover research focus points with demonstrations and explanations of the research characteristics involved.

In parallel, explanations are provided from lesson to show what is the purpose of research for the economic world, what are the links woven by engineers working in companies with public laboratories, and finally what are the types of jobs in the research word either public or private.

Outline

1- Why doing research in Europe ?
2- Who is doing research in France ?
2-1 at the University
2-2 in the company
3- Research at the University
3-1 Master & Ph.D. student
3-2 Postdoc
3-3 assistant prof and prof
4- Research in a company
4-1 internal research
4-2 collaborative research project
4-3 links between companies and publics labs

Goals

The aim is to give a global vision of the missions, processes and careers of scientific research. In fact, research is one of the ways for graduate engineers, PhDs or research engineers, in public or private laboratories. It is a trajectory better prepared when done at early stage. The engineer in enterprise, start-up or large group, may also be required to collaborate, for its innovations, with a research laboratory.

The educational activity will be partly based on LS2N research team visits. This activity follows the interviews of researchers made in the 3rd year in HES "Discovery of trades".

Prerequisites

none

Manager : Jean-Pierre GUEDON

Disrupt Campus Nantes

Hours

Lect	Tut	PW	Proj	WP	Asst
3	43.5		150		42

Evaluation

One evaluation : *Pratique*

Manager : Antoine PIGEAU

Distributed and Cooperative Systems

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5				6

Evaluation

One evaluation : *Théorie*

Outline

Distributed algorithms
- Definitions and limitations
- Some fundamental algorithms

Peer-to-peer systems
- Applications to decentralized collaborative software design

Goals

Actually distributed applications, i.e., without centralised control, are subject to inherent limitations that have to be understood in order to develop distributed algorithms. One can then differentiate between algorithms with "strong" guarantees, and distributed applications where participants have a lot of freedom, such has peer-to-peer applications.

Bibliography

Tanenbaum A., van Steen M. ; Distributed Systems: Principles and Paradigms ; Prentice-Hall
Raynal M. ; La communication et le temps dans les réseaux et les systèmes répartis, Tome 1 ; Eyrolles
Raynal M. ; Gestion de données réparties : problèmes et protocoles, Tome 2 ; Eyrolles
Raynal M. ; Synchronisation et état global dans les systèmes répartis, Tome 3 ; Eyrolles

Prerequisites

Main notions of networks and systems, graph theory, processes modelling, functional programming, algorithmics, and databases

Learning outcomes

Learning outcomes	N	A	M	E	O
• Deal with causality and logical timing	·	·	✓	·	·
• Ensure transactional properties	·	·	✓	·	·

Manager : José MARTINEZ

Données en flux S10 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
3		3			

Evaluation

One evaluation : *évaluation*

Données multimedia S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7	7	10			

Evaluation

2 evaluations :

- *théorie*
- *pratique*

Manager : Marc GELGON

Données spatiales S10 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
6		6			

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Découverte de la recherche FISA S8

Hours

Lect	Tut	PW	Proj	WP	Asst
	25				

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Ecological and Societal Transition S7

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Emilie GADOIN

Ecological and Societal Transition S8

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Emilie GADOIN

Economy

Hours

Lect	Tut	PW	Proj	WP	Asst
	20				

Evaluation

One evaluation : *Devoir sur table*

Manager : Chrystèle GONCALVES

Enjeux de société et d'entreprise S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
	8				

Evaluation

One evaluation : *théorie*

Enjeux de société et entreprise

Hours

Lect	Tut	PW	Proj	WP	Asst
	4				

Evaluation

One evaluation : *Evaluation*

Enjeux de société et entreprise FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
	16				

Evaluation

One evaluation : *Evaluation*

Enjeux de société et entreprise FISA S8

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

Enterprise content management

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75	0.25	6			

Evaluation

One evaluation : *Théorie*

Manager : Antoine PIGEAU

Entrepeneurship - Professional training contract

Hours

Lect	Tut	PW	Proj	WP	Asst
			120		24

Evaluation

One evaluation : *Pratique*

Manager : Antoine PIGEAU

Entrepreneurship S7

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : John KINGSTON

Entrepreneurship S8

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : John KINGSTON

Ethical, social and environmental issues in computer science

Hours

Lect	Tut	PW	Proj	WP	Asst
9					

Evaluation

One evaluation : *Evaluation*

Manager : Pascale KUNTZ-COSPEREC

Exploratory data analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	4.5	9			16

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1- Introduction
2- Principal Component Analysis
3- K-means
4- Hierarchical classification

Goals

Introduction to exploratory data analysis (Principal Component Analysis and Automatical Classification)

Bibliography

Barthélemy J.P., Brucker F.(2007). Eléments de classification, Hermès
A.G. Gordon (1999). Classification, Chapman & Hall
Saporta G. (2011). Probabilités, analyse de données et statistiques, Editionstechnip

Prerequisites

Descriptive statistics

Manager : Pascale KUNTZ-COSPEREC

Expressing work and competences from company-related work

Hours

Lect	Tut	PW	Proj	WP	Asst
			10	300	

Evaluation

One evaluation : *Analyse compétences*

Manager : Marc GELGON

Final Project

Hours

Lect	Tut	PW	Proj	WP	Asst
				750	

Evaluation

One evaluation : *Pratique*

Goals

The purpose is to perfect the training of engineering students in real-life work experience inside a company. The student enhance his technical, organisational and human skills by being subject to the daily difficulties and contingencies of an engineer.

Manager : Nicolas NORMAND

Fourier analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
	13.5				10

Evaluation

One evaluation : *Théorie*

Outline

1. Intuitions and applicative uses of the frequential representation
   2. Vector spaces
   3. Fourier series : definition, properties, exercises
   4. Fourier transform : definition, properties, exercises
   5. Convolution
   6. 2-dimensional Fourier transform

Goals

This set of mixed lecture/exercise sessions presents Fourier analysis, which is fundamental to several applications and further studies in signal and image processing. It covers continuous-time function (vs. discrete-time signal processing). We cover Fourier series and Fourier transform, with an engineering viewpoint, rather than a «fundamental mathematics» perspective. It is also an opportunity to revise and practice.

Manager : Marc GELGON

French as a Foreign Language for engineering students

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Functional programming

Hours

Lect	Tut	PW	Proj	WP	Asst
5	5.5	4.5			3

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

- Imperative Vs Functional programming
  - anonymous function, local functions
  - typing : polymorphism, higher order
  - iterators
  - algebraic data types (trees)
  - symbolic manipulation of expressions
  - introspection : interpretation of a functional language.

Goals

Functional programming and functional languages allow to make abstraction of the hardware and to focus on the problem to be solved, with resulting programs generally easier to write and to maintain (than imperative programs).

Although the origin of the functional languages is quite old, these languages or the concepts coming from these languages have been adopted late in the software industry, and we now find them in various areas (Erlang, F #, garbage collector, anonymous functions and higher order in C ++, Java and C # , parametric polymoprophism in Java...).

This goal of this lecture is to learn functional programming (with a functional language, here OCaml).

Learning outcomes

Learning outcomes	N	A	M	E	O
• Program an algorithm in a purely functional way (no side-effects)	·	·	✓	·	·
• Use higher order to get genericity and exploit reuse.	·	·	✓	·	·
• Implement data structures with algebraic types, handle them with pattern matching and iterators	·	·	✓	·	·
• Understand how the choice of the data structure influences the mantenability of the whole program	·	✓	·	·	·

Manager : Julien COHEN

Game theory

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	1.5				4

Evaluation

One evaluation : *Théorie*

Outline

Module 1: Non-cooperative games
* Zero-sum games
* Nash equilibrium
* Pure and mixed strategies
* Backward induction
* Incomplete information games

Module 2: Cooperative games
* Coalitional games
* Bargaining game
* How to cooperate in a non-cooperative context?

Module 3: Application to negotiation

Bibliography

* Martin J. OSBORNE. An introduction to game theory, Oxford University Press, 2003.
* Murat YILDIZOGLU. Introduction à la théorie des jeux. Dunod, 2003.
* David KREPS. Théorie des jeux et modélisation économique. Dunod, 1999.

Prerequisites

If possible, basic notions in Preference Modelling or Multi-Criteria Decision Analysis or Social Choice Theory.

Manager : Julien BLANCHARD

Gestion de projet FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
	6				

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

Grammar and professional English 1

Hours

Lect	Tut	PW	Proj	WP	Asst
	40				

Evaluation

2 evaluations :

- *CC*
- *DS*

Grammar, Toeic and professional English 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	39	2			

Evaluation

3 evaluations :

- *CC*
- *Toeic*
- *Tutorat*

Graph theory

Hours

Lect	Tut	PW	Proj	WP	Asst
10	7.5				23

Evaluation

One evaluation : *Théorie*

Outline

1- Introduction
2- Trees
3- Graph drawing and planar graph
4- Shortest path
5- Coloration

Goals

Introduction to problem modeling with graphs. Being able to apply the classical algorithms. Introduction to algorithmic complexity

Bibliography

Berge C. (1973). Graphes et hypergraphes, Dunod, Paris J.C. Fournier (2007). Graphes et applications 1 et 2, Lavoisier Diestel R. (1997). Graph theory, Springer Di Battista G. Eades P., Tamassia R., Tollis I.G. (1999). Graph drawing - Algorithms for the visualisation of graphs, Prentice-Hall Harary F. (1972). Graph theory, Addison-Wesley

Prerequisites

No pre-requisites

Manager : Pascale KUNTZ-COSPEREC

History of organizations and Accounting business game

Hours

Lect	Tut	PW	Proj	WP	Asst
9	10.5	12			5

Evaluation

One evaluation : *Soutenance + CC*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	·	✓	·	·	·

Manager : Chrystèle GONCALVES

Human-computer interaction

Hours

Lect	Tut	PW	Proj	WP	Asst
5	7.5				8

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1- Introduction
2- The human par of HCI
3- Designing HCI
4- Evaluating HCI
5- Graphical system
6- MVC Architecture
7- Widgets
8- Swing : undo/redo
9- Internationalization

Goals

The goals are :
- discover Human Computer Interaction
- discover how to design and evaluate Human-Computer Interfaces
- discover the functionalities of a graphical system
- discover the architecture Model-View-Controler

Bibliography

Alan J. Dix, Janet E. Finlay, Gregory D. Abowd, and Russell Beale. Human-Computer Interaction. Prentice Hall International, 3rd edition, 2004.

Albert Janssens système X WINDOW, la bible du programmeur. Edition Eyrolles, 1993.

Jean-François Nogier Ergonomie du logiciel et design web. Dunod, 2005.

B. Shneiderman. Designing the User Interface, Strategies for Effective Human-Computer Interaction. Addison Wesley Publishing, 2005.

Jenifer Tidwell, Designing Interfaces, O'Reilly, 2011.

Prerequisites

JAVA programming
Object-oriented design and UML

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know human perceptive and cognitive capabilities, be able to think about the user experience of a product	·	✓	·	·	·
• Know how to describe users and scenarios of a new product	·	✓	·	·	·
• Know when and how to evaluate an interactive product	·	✓	·	·	·
• Understand a user Interface system	·	✓	·	·	·
• Know the architecture modelization of a user interface	·	·	✓	·	·
• Know to implement a MVC architecture	·	·	✓	·	·

Manager : Yannick PRIE

Hyblab project : data, web and interdisciplinarity

Hours

Lect	Tut	PW	Proj	WP	Asst
			23		27

Evaluation

3 evaluations :

- *Soutenance*
- *Rapport de projet*
- *Rendu du code*

Presentation

The Hyblab project is an interdisciplinary project that proposes to Polytech students some team work with students from other schools and fields (design, arts, communication). They work by group on a common topic, provided by an external partner (media, company, public authority).

Outline

1. Explore, analyse and make sense of your data
   2. Find a story to tell, a message to convey
   3.Look for the best datavisalizations
   4.Participate to the graphic design
   5. Choose a data structures and software libraries
   6. Build the web application

Goals

An engineer in computer science should not only have technical skill but he should also be able to work in an heterogenous environment comprising team mates and client that do not share the same culture and vocabulary. The Hyblab project provides a first interdisciplinary experience that will be a key in asset in the professional life of young engineers.

This project aims at creating a web application what will help understanding, exploring, or enriching a data set provided by an external partner. The students will analyse the dataset in order to find / highlight relevant information. Then, they will have to find the best way to convey this knowledge through interactive visualizations.

Bibliography

- http://www.hyblab.fr
  - http://jplusplus.github.io/guide-du-datajournalisme/
  - https://github.com/mperreir/Hyblab/wiki

Prerequisites

- XML and web technologies
  - Human Computer Interaction
  - Statistical Processing of Information
  - Data Analysis
  - Databases

Learning outcomes

Learning outcomes	N	A	M	E	O
• Web development	·	·	✓	·	·
• Data analysis and visualization	·	✓	·	·	·
• Project management	·	✓	·	·	·
• Communication / collaboration with other disciplines	·	✓	·	·	·
• Graphic design	✓	·	·	·	·

Manager : Matthieu PERREIRA DA SILVA

Image processing

Hours

Lect	Tut	PW	Proj	WP	Asst
15	1.5	10.5			23

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Image representation, colour spaces, elementary statistical descriptors
Linear and median filtering, convolution
Fourier analysis, several other linear decompositions
Statistical image classification, regularization
Mathematical morphology
Multi-image geometry, image matching, motion analysis
Introduction to 3D computer graphics and tomography.

Goals

In this topic, students will get familiar with fundamentals of digital image processing : image representation, processing and applications. Image processing is at the same time a means of covering, with an applied perspective, many fundamental of mathematics that come useful in computer science : statistics, optimization, Fourier analysis, linear algebra.

Bibliography

Horaud R., Monga O. ; Vision par ordinateur : Outils fondamentaux ; Hermès, 1993
Bovik A. ; Handbook of Image and Video Processing ; IEEE/Academic press, 2000
Kunt M., Granlund G., Kocher M.; Traitement nume?rique des images ; Presses polytechniques Romandes, 1993
Jain A. K. ; Fundamentals of Image Processing ; Prentice-Hall, 1990

Prerequisites

Linear algebra
Elementary Fourier analysis
Statistics and probabilities
Information theory

Manager : Marc GELGON

Information systems design and modelling

Hours

Lect	Tut	PW	Proj	WP	Asst
10	7.5	3			8

Evaluation

2 evaluations :

- *Theorie*
- *Pratique*

Outline

1. Introduction: relational model
   2. The relational algebra and the relational calculus
   3. Database security and authorization
   4. Disk storage Indexing file structures and hashing
   5.Distributed databases and client-server architectures

Goals

This course inytroduces the fundamental concepts necessary for designing, using and implementing databases in a centralized and in a distributed environment.

Bibliography

Ramakrishnan R., et al. ; Database management systems ; McGraw-Hill, 2003

Gulutzan P., et al. ; Performance Tuning, 2nd Edition ; Morgan Kaufmann, 2001

Delmal P. ; SQL2-SQL3 : applications à Oracle ; Université de De Boeck, 2001

H. Garcia-Molina, J. Ullman, and J. Widom. ; Database Systems : The Complete Book ; Prentice Hall, 2008, (2nd edition)

Manager : Marie-Pierre NACHOUKI

Information theory

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	6				10

Evaluation

One evaluation : *Théorie*

Presentation

In this course, we present the basics of Shannon's information theory. The first part defines the concepts of entropy, reversible encoding of the source, and mutual information. The second part explains the theory of detectors-correctors codes. It is then put into practice with linear codes and cyclic codes on binary codes. To finish this part, we present some examples for packet loss.

Outline

Introduction with the notion of Information. Notion of source entropy. Computation of entropy for a given source and limits for the entropy. Notion of entropy of a system (joint entropy) and mutual information, channel capacity. To know and use standards algorithms of entropic compression (Huffman, Shannon-Fano). Notions of detetcing and correcting codes. Hamming correcting codes, linear correcting codes, cyclic correcting codes (CRC), Reed Solomon Codes.

Goals

Understand what Information is. To know how to handle the entropy notion and compute it for a given information source. Undestand the elements of an information system (source coding, channel coding, noise, associted decoding). To know how to implement a scheme of entropic compression.

Bibliography

A Mathematical Theory of Communication by Claude E. Shannon ... in the July and October 1948 editions of the Bell System Technical Journal [

Manager : Jean-Pierre GUEDON

Information visualization

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75	1	6.75			6

Evaluation

3 evaluations :

- *Théorie*
- *Construction visu*
- *Analyse visu*

Outline

1- Introduction: history an evolution of HCI
2- Design of interactive products: general process, users, scenriios, screens, navigation
3- Users' perceptive and cognitive abilities
4- User experience: importance, emotions in HCI, appropriation
5- Evaluate an interactive product: when, how?
6- Information visualisation: definition and objectives, history, principles
Many examples and small design/evaluation workshops.

Goals

Know the bases of Human-Computer Interaction and information visualisation from a non-technical point of view: knowing the users, designing interaction and interfaces, evaluating an interactive product. Be able to design better products and to interact with specialists (designers, ergonomists, etc.)

Bibliography

Alan J. Dix, Janet E. Finlay, Gregory D. Abowd, and Russell Beale. Human-Computer Interaction. Prentice Hall International, 3rd edition, 2004.

B. Shneiderman. Designing the User Interface, Strategies for Effective Human-Computer Interaction. Addison Wesley Publishing, 2005.

Jenifer Tidwell, Designing Interfaces, O'Reilly, 2011.

Prerequisites

Programming, project management.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know HCI history and be able to foresee its future	✓	·	·	·	·
• Know how to describe users and scenarios of a new product	✓	·	·	·	·
• Know when and how to evaluate an interactive product	✓	·	·	·	·
• Know human perceptive and cognitive capabilities, be able to think about the user experience of a product	✓	·	·	·	·
• Be able to analyse and design an information visualisation	✓	·	·	·	·

Manager : Yannick PRIE

Intercultural explorations

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Internet multimedia

Hours

Lect	Tut	PW	Proj	WP	Asst
3	1	8			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

QoS introduction
End-to-end strategies
Forward Error Correcting code and Mojette code
Unequal Error Protection of information
Multiple description coding
Networks Strategies: IntServ and DiffServ
Applications
Labs:
- Initiation QualNet simulator
- DiffServ on QualNet
- QoS and VoIP (Telephony over IP)

Goals

To describe networks and coding mechanisms for transport and restitution of communicating multimedia services

Bibliography

Internet multimedia et temps réel, Susbielle JF, Eyrolles, 2000, 729 p.

JPEG2000 : Image Compression Fundamentals Standards and Practice, Kluwer International Series in Engineering and Computer Science, 2002, 642 p.

The Mojette Transform : Theory and Applications, J. Guédon et al., ISTE-Wiley, 2009, 273 p.

Prerequisites

Network and multimedia

Manager : Benoit PARREIN

Internet of Things

Hours

Lect	Tut	PW	Proj	WP	Asst
3	1.5	5			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Benoit PARREIN

Internship (4th year)

Hours

Lect	Tut	PW	Proj	WP	Asst
				400	

Evaluation

One evaluation : *evaluation*

Manager : Antoine PIGEAU

Introduction au développement logiciel S5 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7		7			10

Evaluation

One evaluation : *DS*

Manager : Fabien PICAROUGNE

Introduction aux systèmes distribués FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5		7.5			8

Evaluation

One evaluation : *Evaluation*

Introduction to artificial intelligence

Hours

Lect	Tut	PW	Proj	WP	Asst
10	6				16

Evaluation

One evaluation : *Théorie*

Outline

Introduction
- Short history and definitions

Exploratory Techniques
- State graphs and sub-problems graphs
- Recursive exploration and graph traversals
- Application to games

Heuristic Techniques
- Choice ordering, constraint propagation, cycle detection, A*, etc.
- Machine learning with neural networks

Goals

Basic tools in Artificial intelligence are well-defined. It is mostly about exploring search spaces, using algorithmic and/or heuristic techniques.

Bibliography

Hofstadter D. R. ; Gödel, Escher, Bach : les Brins d'une Guirlande Éternelle ; InterÉditions

Laurière J.-L. ; Intelligence artificielle : résolution de problèmes par l'Homme et la machine ; Eyrolles

Pearl J. ; Heuristiques : stratégies de recherche intelligentes pour la résolution de problèmes par ordinateur ; Cépaduès Éditions

Russel S. and Norvig P. ; Artificial Intelligence: A modern approach ; 3rd edition (2010), Prentice Hall

Prerequisites

Graph Theory; Combinatoric Notions; Data and Knowledge Modelling; Algorithmics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Modelling a problem as a state transition problem	·	·	✓	·	·
• Exploring combinatorics search spaces	·	·	✓	·	·
• Provide heuristics	·	✓	·	·	·

Manager : José MARTINEZ

Introduction to calculability and complexity theories

Hours

Lect	Tut	PW	Proj	WP	Asst
5	6				14

Evaluation

One evaluation : *Théorie*

Outline

Introduction to the calculability theory
- Problems, algorithms, and calculabilty models
- Turing machines
- Problems undetermined, indecidable, semi-decidable, and decidable

Introduction to the complexity theory
- Reasonable coding schemes
- Asymptotic complexities
- Intractability, P, NP, and NPC classes

Goals

Computer-solved problems become more and more complex. However, a computer is unable to compute everything, both in practice and in theory!

The theoretical bases of these limitations are introduced. In that way, it is possible to avoid trying to solve an unsolvable problem, or reusing state-of-the-art solvers for the most complex and intractable ones.

Bibliography

Hopcroft J. E., Ullman J. D. ; Introduction to Automata Theory, Languages, and Computation

Garey M. R., Johnson D. S. ; Computers and Intractability : A Guide to the Theory of NP-completeness ; Freeman

Wolper P. ; Introduction à la calculabilité ; Dunod

Prerequisites

Mathematical Modelling (logic, set theory, graph theory...); Algorithmics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Formalise a decision problem	·	·	✓	·	·
• Reduce from a problem to another	·	·	✓	·	·
• Enumerate computable sets	·	·	✓	·	·

Manager : José MARTINEZ

Introduction to computer networks

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75	10.5	15			30.5

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

This first course about computer networks aims to drive the students to know their basics and in particular the OSI and TCP / IP stacks.

The course is completed by exercises (TD) and labs (TP).

Outline

1 - Basics and definitions

2 - Local Area Networks - Layer 1: Bit, media, cables

3 - Local Area Networks - Layer 2: Frame, non-hierarchical address, deterministic / non-deterministic MAC protocols, physical / logical topologies, common LAN technologies, LAN devices, segmentation

4 - Local Area Networks - Layer 3: Packet, hierarchical address, routing, IPv4, subnets, routers, ICMP, ARP, routed protocols, routing protocols, static / dynamic routing

5 - Local Area Networks - Layer 4: service levels, TCP / UDP, socket

6 - Local Area Networks - Layer 5: Sessions

7 - Local Area Networks - Layer 6: Data presentation

8 - Local Area Networks - Layer 7: Network applications (examples)

Goals

To know the fundamentals of computer networks.

Bibliography

A. Tanenbaum : Réseaux (éd. Prentice Hall, Pearson Education France, plusieurs éditions).

G. Pujolle : Les Réseaux (éd. Eyrolles, plusieurs éditions)

Prerequisites

Computer and operating systems 1

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the basics of computer networks.	·	·	✓	·	·
• To know the OSI and TCP/IP stacks.	·	·	✓	·	·
• To know how to size and configure a LAN.	·	✓	·	·	·

Manager : Vincent RICORDEL

Knowledge discovery in data

Hours

Lect	Tut	PW	Proj	WP	Asst
13.75	4.5	6			12.5

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1. Introduction to EDC
   What is KDD ("data-mining", "text mining", "knowledge-mining")?
   Industrial and scientific issues. KDD process and life cycle of knowledge. rule Discovery and rules.
   2. Knowledge discovery algorithms
   Learning techniques (supervised, unsupervised), classification. . . Decision Trees and graphs. A-Priori algorithm. Data mining tools and commercial software. Case study (Felix, SAS, Weka).
   3. Quality Measures in knowledge discovery
   Conventional indices and their limitations. Intensity of implication.
   4. Visualization tools
   How to choose a representation adapted to the nature of the data? Networks of rules. Illustrations.

Goals

The objective is to present the concepts, models and algorithms used in knowledge discovery in data (KDD), also so-called data mining.

Bibliography

Han J., Kamber M. ; Data Mining Concepts and Techniques ; Morgan Kaufmann, 2011.
Lefébvre R., Venturi G. ; Le Data Mining ; Eyrolles, 2000
Jambu M. ; Introduction au Data Mining ; Eyrolles, 1998

Prerequisites

Data analysis
Relational databases
Data warehouses
Graph Theory
Probability and statistics

Manager : Fabrice GUILLET

Knowledge-based systems project

Hours

Lect	Tut	PW	Proj	WP	Asst
		9			18

Evaluation

One evaluation : *Pratique*

Outline

Modelling a complex problem
  Solving it thanks to AI techniques
  Implementing it in Prolog

Goals

Practice Artificial Intelligence fundamentals.

Prerequisites

Artificial Intelligence Fundamentals; Recursive algorithms; Prolog

Learning outcomes

Learning outcomes	N	A	M	E	O
• Modelling a problem as a state transition problem	·	·	✓	·	·
• Exploring combinatorics search spaces	·	·	✓	·	·
• Provide heuristics	·	·	✓	·	·
• Analyse a real-world problem	·	✓	·	·	·

Manager : José MARTINEZ

Logique FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
8	12				10

Evaluation

One evaluation : *DS*

Long-term industrial project 1

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5			50		110

Evaluation

One evaluation : *Pratique*

Presentation

An innovative project is given by an industrialist to a trinomic engineering students. A teacher tutor is assigned to the project as well as a company tutor. The composite team will propose solutions for the project, model them and program them to have an operational solution at the end of the project.

Outline

An innovative project from a company is proposed for each trinomial students. This project includes bibliographic aspects, computer science, software engineering, and the humanities (with study or marketing oriented, sustainable development, change management, etc.). This semester, a pre-assessment software engineering (model V-cycle or agile) project will be realized.

Goals

To know how to drive innovative IT project proposed by a company group. To know how to discuss with the client to understand the expectations of the end user. To know how to build a specification and to the state of the art.

Manager : Philippe LERAY

Long-term industrial project 2

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5			62		124

Evaluation

One evaluation : *Pratique*

Goals

The third and final stage of the industrial project consists to implement, test and deliver the software which has been completely defined at the design stage. This phase allows equally to practice the technical skills of engineering students as their organizational skills, especially when faced with unexpected or last minute changes. In addition, the end of the project must be accompanied by a reflection on its relationship to environmental management. As an appendix to the main document, a short report will review this reflection.

Manager : Philippe LERAY

Methodes et outils devops FISA S8

Hours

Lect	Tut	PW	Proj	WP	Asst
9		12	8		

Evaluation

One evaluation : *Evaluation*

Mini projet IA S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
	9	15			

Evaluation

One evaluation : *Evaluation projet*

Mini projet programmation objet

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	2.5				25

Evaluation

One evaluation : *Evaluation projet*

Manager : Julien COHEN

Modelling-Web-HCI project

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				30

Evaluation

One evaluation : *Projet*

Presentation

This project is an introduction to the life cycle of a software project. The following points are explored : requirement engineering, design (object oriented), development (object oriented in Java), estimation of effort, planification, team work, validation (test).

The students work in a team of 4 students. Each team has to build a software described by a "customer".

Outline

The 6 phases of the project are:
- client meeting
- requirement
- conception
- module implementation
- integration
- acceptance test

Goals

Introduction to Software engineering
Application Modeling
Java Implementation of an application

Prerequisites

Programming with objects: Java langage
UML
Algorithmic

Learning outcomes

Learning outcomes	N	A	M	E	O
• Be able to get the requirements, even those which are left implied	✓	·	·	·	·
• Produce a design which conforms to the requirements and which allows a source code of good quality	✓	·	·	·	·
• Share the writing of a source code between 3 or more persons	✓	·	·	·	·
• Teamwork : divide some tasks according to the skills of the members of the team	✓	·	·	·	·
• Evaluate the gap between the finished product and the initial need	✓	·	·	·	·
• OOP : build a complete sofwtare using OOP and Java	·	·	✓	·	·

Manager : Marie-Pierre NACHOUKI

Modèle et langage relationnel FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
15		15			15

Evaluation

One evaluation : *Evaluation*

Modélisation de problèmes et optimisation combinatoire FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	1.5				

Evaluation

2 evaluations :

- *théorie*
- *mini projet*

Manager : Pascale KUNTZ-COSPEREC

Multicriteria Decision Analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	6				10

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

Multicriteria decision analysis (MCDA) is a collection of methods within the operational research whose goal is to provide assistance to a decision maker to choose from a set of alternatives or actions described by several often conflicting criteria. A typical example is the problem of choosing an apartment, each apartment is described by its rent, surface, distance to work, etc...

Outline

1. General information on multicriteria decision analysis
   Criterion, Actions, Dominance, Pre-order
   Dominance and satisfaction analysis
   2. Principles methods based on a single criterion
   3. Principles of outranking methods
   Outranking relation
   Electre I
   4. Principles of methods based on distance to an ideal action
   Distance to the ideal, the anti-ideal
   TOPSIS
   5. Links with social choice theory

Goals

The objectives of this course are to understand the basic theoretical principles related to preference modeling and multi-criteria decision support, to study the basic methods for this task, and to implement them in a case study.

Bibliography

Vincke P. ; Multicriteria Decision-Aid ; Wiley, 1992

Roy B., Bouyssou D. ; Aide multicritère à la décision : méthodes et cas ; Economica, 1993

Belton V., Stewart T.J. ; Multiple Criteria Decision Analysis - an integrated approach ; Kluwer Academic Publishers, 2002

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowing definitions of the following notions : pre-order, criterium, optimum of Pareto	·	·	✓	·	·
• Applying MCDA method based on a single criteron	·	✓	·	·	·
• Applying MCDA method based on outranking	·	✓	·	·	·
• Applying MCDA method based on ideal action	·	✓	·	·	·

Manager : Philippe LERAY

Multimedia

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5	1.5	9			16

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Goals

This topic provides scientific and technical background, both from theory and practice, about processing of audio and visual data.

Prerequisites

Information theory.
Linear algebra
Statistics
Probabilities

Multimedia machine learning and coding

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	1.5	12	9		20

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Prerequisites

Image processing
Information theory

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understand and be able to describe the mechanisms (algorithms, influence of parameters) involve in compressing and transmitting audiovisual documents.	·	·	✓	·	·
• Understand applications, stakes and a few typical data analysis techniques applied to multimedia data, for information retrieval	·	✓	·	·	·
• Understand the stakes and organization of the following documents : patent, standard, scientific paper	✓	·	·	·	·
• Improve capability and understanding of one's mathematical background by having applied it to several multimedia data processing tasks.	·	✓	·	·	·

Manager : Marc GELGON

Natural language processing

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5	8.5			8

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Introduction linguistics Ambiguity Part-of-speech and morphology : word segmentation String searching algorithms Statistical inference : n-gram Models over sparse data Hidden Markov models. Viterbi algortihm Transformatio-base learning of tags Syntactic parsing Programming language:Python Nltk library

Goals

Initiation of Natural language processing dedicated to train language-engineering professionals. The course focus on classical approaches but also empirical and statistical approaches. For each theoritical linguistic dimensions, lexicals and Syntax, we study the stat-of-the art data structures and algorithms.

Bibliography

Foundations of Stastistical Natural Language Processing, Christopher D. Manning et Hinrich Schütze, MIT, 1999. Handbook of Natural Language Processing, Second Edition (Chapman & Hall/Crc: Machine Learning & Pattern Recognition), Nitin Indurkhya and Fred J. Damerau (eds), 2010. Speech and Language Processing (2nd Edition) Daniel Jurafsky. 2008.

Prerequisites

Formal languages and automata Elementary probability theory

Manager : Marc GELGON

Negotiations

Hours

Lect	Tut	PW	Proj	WP	Asst
3	7.5				2

Evaluation

One evaluation : *Vidéo*

Bibliography

Stimec A. ; « La négociation » ; Dunod
Fisher, Ury ; « Comment réussir une négociation » ; Seuil

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-4	✓	·	·	·	·

Manager : John KINGSTON

Network Application Security Policy

Hours

Lect	Tut	PW	Proj	WP	Asst
	0.5	9.5			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Rémi LEHN

Neuronal methods

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	4	1.5			10

Evaluation

One evaluation : *Théorie*

Outline

1 - Introduction
2 - Digitalizing
3 - Pre processing
4 - Recognition
5 - Electronic Document Management System

Goals

The objective of this course is to present the issues and technologies dedicated to printed documents in information systems. In particular, how to identify the issues raised by the dematerialization of structured documents of all types and provide solutions in terms of Automatic Document Reading and indexation.

Bibliography

- Rabiner, L. and Juang, B. : An introduction to hidden Markov models, ASSP Magazine, IEEE, 3(1), 1986.
- Beliad, A. : Reconnaissance automatique de l'écriture et du document. Pour la Science, 2001.

Prerequisites

- probabilities
- image processing

Manager : Hoël LE CAPITAINE

New interactions

Hours

Lect	Tut	PW	Proj	WP	Asst
5	1	6			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Toinon VIGIER

Object-oriented programming and Java

Hours

Lect	Tut	PW	Proj	WP	Asst
11	2	13.5			16

Evaluation

2 evaluations :

- *Pratique*
- *Théorique*

Outline

- Encapsulation in OOP (Object Oriented Programming) and Java
  - Sub-typing in OOP and Java
  - Specialisation in OOP and Java
  - Other OOP principles
  - Other Java mechanisms
  - Good and bad practices in OOP

Goals

Object-oriented programming has become indispensable in the software industry, altogether in development processes (object-oriented design and languages), in popular frameworks (for example based on Java), or even in "imposed" languages (Javascript in web browsers).

In this course we study the principles of object programming and how the use of these principles and their exploitation in object-oriented languages improves the quality of the code (compared to a simple imperative language).

In addition, we will use the Java language. We will study the particularities of Java and the good ways of using them, still with the goal of having a source code of high quality.

Bibliography

La programmation orientée objet, Hugues Bersini Eyrolles; Édition : 5e édition (5 janvier 2011)

Design patterns, Eric Freeman, Editeur : O'Reilly Editions (22 septembre 2005)

Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, , Richard Helm, Ralph Johnson, John Vlissides, Addison-Wesley professional computing series

Prerequisites

C language

Learning outcomes

Learning outcomes	N	A	M	E	O
• OOP : understand and implement encapsulation	·	·	✓	·	·
• OOP : use encapsulation to get a good modularity	·	✓	·	·	·
• OOP : implement and use sub-typing	·	·	✓	·	·
• OOP : use sub-typing to get a good genericity	·	✓	·	·	·
• OOP : implement and use specialisation (sub-classes, inheritance)	·	·	✓	·	·
• OOP : use specialisation to get a good reuse rate	·	✓	·	·	·
• OOP : understand the differnece between instance members and class member.	·	·	✓	·	·
• Java : understand the language mechanisms : overloading, primitive types, dynamic and static dispatch, methods of the Object class, polymorphc parametrism, enum types, exceptions...)	·	·	✓	·	·
• Java : Understanding a limited part of the standard library (Collections in particular)	·	·	✓	·	·

Manager : Julien COHEN

Offensive Security and Penetration Testing

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	0.5	6			6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Rémi LEHN

Operating systems 2

Hours

Lect	Tut	PW	Proj	WP	Asst
14.5	1.5	16.5			17

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

1. Process management: scheduling and execution. Operations. HWP and LWP Process. IPC
2. Process scheduling: mono / multi processors. FCFS scheduling, EFRC, Tourniquet.
3. Memory Management: Mono / multi-programming and memory. Allocation. Virtual memory. Paging and segmentation. Page replacement.
4. Process synchronization Parallelism and competition. Resources and critical section. Semaphores and monitors.
5. Key Issues: Producers-consumers. Readers-writers. philosophers.
6. System Programming: C programming interface of Unix ("Application Programming Interface" API) fork, I/O, ipc, pthreads

Goals

The goal is to understand the advanced software mechanisms (API) of the operating systems for application programming

Bibliography

Tanenbaum A. ; Systèmes d'exploitation systèmes centralisés et systèmes distribués ; InterÉditions, 1994.
Silberschatz A., Galvin P. B. ; Principes des systèmes d'exploitation ; ÉdiScience international, 1988.
Beauquier J., Bérard B. ; Systèmes d'exploitation concepts et algorithmes ; Inter Éditions, 1994

Prerequisites

User commands in unix
C language programming

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understanding of the mechanisms of process management, scheduling and execution.	·	·	✓	·	·
• understanding of the advanced mechanisms of the virtual memory management	·	·	✓	·	·
• Know-how use tools for process synchrinization	·	✓	·	·	·
• Coding with semaphores	·	·	✓	·	·
• Programming synchronizations with monitors	·	·	✓	·	·
• Advanced programming with C API of unix	·	·	✓	·	·

Manager : Fabrice GUILLET

Outils pour le développement logiciel S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5		8			

Evaluation

One evaluation : *pratique*

Manager : Marc GELGON

Parallel Computing

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	1.5	9			9

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Introduction to parallelism... s

Parallel computers: Architectures with shared memory (Flynn's classification), virtually shared memory and distributed memory

Expressing parallel computations: Data parallelism, task parallelism, and hybrid parallelism

Parallel algorithmics: Work, effective work, Amdhal's law, NC class, optimal and extensible algorithms

"Parallel" optimisations: Techniques for mono- and multi-processors

Goals

We are interested in high performance processing. Dedicated parallel architectures are unavoidable for attaining the highest performances. However, a set of interconnected computers can also achieve high performances, if one knows how to...

Bibliography

Cormen T., Leiserson C., Rivest R. ; Introduction à l'algorithmique ; Dunod

Cosnard M., Trystram D. ; Algorithmes et architectures parallèles ; InterÉditions

Prerequisites

Computer Architectures; Networks and Telecommunications; Algorithmics; C Programming Language

Learning outcomes

Learning outcomes	N	A	M	E	O
• Write down data parallel algorithms	·	·	✓	·	·
• Evaluate the time and surface complexities	·	✓	·	·	·
• Write down parallel recursive algorithms	·	✓	·	·	·
• Parallelise algorithms on multi-core and multi-machine architectures	·	·	✓	·	·

Manager : José MARTINEZ

Parallélisation de données FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	1.5	3			

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

People and team management

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				6

Evaluation

One evaluation : *DS*

Bibliography

- Le chaos Management / Tom Peters / Intereditions
- Manager dans la complexité / Dominique Genelot / Insep Editions
- Les responsables porteurs de sens / Vincent Lenhardt / Insep Editions
- De la performance à l'excellence / Jim Collins / Village Mondial
- Comment leur dire / Gérard Collignon / Intereditions
- Communiquer, motiver, manager en personne/ Taibi Kahler / Intereditions
- Vidéos d'Edgar Morin sur la complexité / Youtube
- Management et communication : 100 exercices / Denis Cristol / ESF editeur

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Anouk GREVIN

Personal data

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1	6			12

Evaluation

One evaluation : *Théorie*

Outline

Recommandation and personnalization : social media, social networks.

Beneficts of recommender systems

Object description : collaborative tagging

evaluating

User modelling

Collaborative filtering : user/item knn-based

Factorization and latent structures

Evaluation of recommender systems

How recommender systems relate to neighbouring issues (information retrieval, privacy, social networks)

Goals

This topic presents recommender systems and information personnalization : applicative contexts, data from which recommendation may be built, problem modelling, algorithms.

Bibliography

Ricci et al. Recommender Systems Handbook, Springer 2009. Several tutorial papers are indicated to students, varying from year to year.

Manager : Marc GELGON

Physical education and sport 1

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-19	✓	·	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-19	✓	·	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 4

Hours

Lect	Tut	PW	Proj	WP	Asst
	19.5				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Jérôme BEZIER

Predictive analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	3	7.5			10

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Introduction
    Predictive model lifecycle
    Methods and measures for model performance evaluation
    Model selection and hyperparameter tuning
    Resampling methods
    Scoring

Goals

This course focuses on the practical implementation of a predictive machine learning process, and examines the different steps that lead to a "good" model.

Bibliography

Trevor HASTIE, Robert TIBSHIRANI, Jerome. FRIEDMAN - "The Elements of Statistical Learning" - Springer, 2009, 2nd edition

Antoine CORNUEJOLS, Laurent MICLET, Jean-Paul HATON - "Apprentissage artificiel - Concepts et algorithmes" - Eyrolles, 2010, 2e édition

Stéphane TUFFERY - "Data mining et statistique décisionnelle" - Technip, 2010, 3e édition

Prerequisites

Statistical estimation basics
    Notions in data mining and machine learning

Manager : Julien BLANCHARD

Preliminaries: Computer and operating systems

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75					3

Presentation

This class is concerned with the discovery of Unix environment through the shell command language.

Outline

- Principles of unix operating system
  - Command Language
  - File System Management and Protection, mount
  - Command redirection, pipes
  - Search Commands

  Labs with linux:
  - File System Management and Protection
  - Search Commands, regular expressions

Goals

Discovering unix and the shell command language to understand the file system and its organization, manage it, to modify the file permissions; I/Os, redirections; search for files, search with regular expressions.

Manager : Fabrice GUILLET

Probabilistic reasoning systems

Hours

Lect	Tut	PW	Proj	WP	Asst
10	7.5				15

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

Knowledge representation and reasoning gave rise to many models. Probabilistic graphical models, specifically Bayesian networks (BN), initiated by Judea Pearl in the 1980s under the name of probabilistic expert systems have proved being useful tools for the representation of uncertain knowledge and reasoning from incomplete information in many fields such as bioinformatics, risk management, marketing, computer security, transportation, etc..

Outline

1. Introduction to Bayesian networks, or "probabilistic expert systems"
   2. Principle of probabilistic reasoning = probabilistic inference
   3. Some algorithms of probabilistic inference
   Message passing, Junction tree
   4. Introduction to Bayesian networks learning
   Construction by expertise (elicitation)
   Learning from data
   5. BN extensions (temporal problems, decision problems, relational data)

Goals

The objectives of this course are to understand the theoretical principles on which probabilistic reasoning systems such as Bayesian networks are based, to see how these models can be built from expertise or data, and to review certain extensions (dynamic, decisional, relational) of Bayesian networks.

Bibliography

Naïm, P., Wuillemin, P.-H., Leray, P., Pourret, O., and Becker, A. ; Réseaux bayésiens ; Eyrolles, 2004

Pearl, J. ; Probabilistic Reasoning in Intelligent Systems : Networks of Plausible Inference ; Morgan Kaufmann, 1988

Pearl, J. ; Causality : Models, Reasoning, and Inference ; Cambridge University Press, 2000

Prerequisites

Notions of probability and statistics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowing notions of probabilistic reasoning, conditional independance, d-separation	·	·	·	✓	·
• Build a BN from expertise	·	·	✓	·	·
• Knowing principles of probabilistic inference algorithms	·	·	✓	·	·
• Knowing principles of BN learning algorithms	✓	·	·	·	·
• Knowing principles of some BN extensions (dynamic, decision, relational BN)	✓	·	·	·	·

Manager : Philippe LERAY

Probability

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	4.5	1.5			12

Evaluation

One evaluation : *Théorie*

Outline

Introduction
- Basic notions
- Probabilities
- Random variables
- Common probability distributions
- Theorems
- Random couples

Goals

To study the basic concepts of probability theory to model and solve real or theoretical problems.

Bibliography

Ross S. M. ; « Introduction to probability models » ; Academic Press, 2009, 10e édition
Saporta G. ; « Probabilités, analyse des données et statistique » ; Technip, 2006, 2e édition
Bogaert P. ; « Probabilités pour scientifiques et ingénieurs » ; De Boeck, 2006

Manager : Julien BLANCHARD

Problem modelling and combinatorial optimization

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	1.5				8

Evaluation

One evaluation : *Théorie*

Outline

1- Introduction
2- Linear programming on a illustration
3- Fitness landscapes and local strategies
4- Genetic algorithms
5- Simulated annealing
6- Ant algorithms

Goals

Introduction to NP- hard problems (travelling salesman problem, graph coloration, ..). Initiation to combinatorial optimization and metaheuristics.

Bibliography

Charon I. Germa A., Hudry O. (1996). Méthodes d'optimisation combinatoires, Masson Cook W.J., Cunningham W.H., Pulleybanck W.H., Schrijver A. (1998). Combinatorial optimization, Wiley
Teghem J., Pirlot M. (2002). Optimisation approchée en recherche opérationnelle, Lavoisier

Prerequisites

Graph theory

Manager : Pascale KUNTZ-COSPEREC

Processus de Business Intelligence S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
6					

Evaluation

One evaluation : *Evaluation*

Professional English 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	19	2			

Evaluation

3 evaluations :

- *Tutorat*
- *CC*
- *DS*

Professional Project 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	4.5				

Evaluation

One evaluation : *CV rendu*

Manager : Sylvaine GAUTIER

Professional Project 4

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				5

Evaluation

One evaluation : *Oral*

Outline

Path : 4 sessions of 3h TD

1 / Portfolio "Exploration Project Professional" : my "professionnel journey" those last years - changes - choices - motivations...

2 / My professionnal project : what I intended, the way to go, anticipate steps (especially the choice of option at the end of the fourth year)

3 and 4 / I introduce myself, my skills, my project : simulations and role plays

Goals

Clarify the professional project and be able to present it orally in different circumstances (professional network meetings, hiring individual or collective interview , student lounge, video resume, ..)

Bibliography

"Le Carnet de Route universitaire et professionnel" - SUIO de l'Université de Nantes - 2008

Prerequisites

Professionnal project 1 (S5)

Discovery of firms and professions (S6)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·

Manager : Sylvaine GAUTIER

Professional project 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	6				6

Evaluation

One evaluation : *Profil linkedin+rdv*

Bibliography

Grant : Givers & Takers TED

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-2	·	·	✓	·	·
• TPN-6	·	✓	·	·	·
• TPN-7	·	✓	·	·	·

Manager : John KINGSTON

Professional project 5

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				2

Evaluation

One evaluation : *Présence*

Bibliography

Ressources : Évolueront selon les thématiques choisies par les intervenants - en lien avec les TPN et les objectifs de ce module.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·

Manager : Sylvaine GAUTIER

Professionnal project 1

Hours

Lect	Tut	PW	Proj	WP	Asst
1.5	12				4.5

Evaluation

One evaluation : *Contrôle continu*

Bibliography

- DE LASSUS René, L'analyse transactionnelle : une méthode révolutionnaire pour bien se connaître et mieux communiquer, Marabout (Savoir pratique n3516), 2013, 288 p., ISBN 2501085493

- DE LASSUS René, La communication efficace par la PNL, Marabout (Bien-être - Psy), 2019, 288 p., ISBN 2501089499

- DE LASSUS René, L'ennéagramme : les 9 types de personnalités, Marabout (Poche Psy n3568), 2019, 288 p., ISBN 2501084950

- DE MONICAULT Frédéric / RAVARD Olivier, 100 questions posées à l'entretien d'embauche, Jeunes Editions (Guides J), 2004 (3e édition), 182 p., ISBN-10 : 2844724221 / ISBN-13 : 978-2844724229

- LEONARD Thomas J., The portable coach, Simon & SCHUSTER, 1999, 336 p., ISBN-10 : 0684850419 / ISBN-13 : 9780684850412

- ROSENBERG Marshall B., Les mots sont des fenêtres (ou bien ce sont des murs) : initiation à la communication non-violente, La Découverte, 2016, 320 p., ISBN 2707188794

- www.16personalities.com

- www.acnv.com

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-2	·	✓	·	·	·
• TPN-6	·	✓	·	·	·

Manager : Sylvaine GAUTIER

Programmation Java FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
10	5	25			

Evaluation

2 evaluations :

- *Evaluation*
- *projet*

Programmation fonctionnelle S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
5	6	7.5			

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Project : Document analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
			9.5		

Evaluation

One evaluation : *Pratique*

Manager : Fabien PICAROUGNE

Project management 1

Hours

Lect	Tut	PW	Proj	WP	Asst
5	4.5				

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

- Goals and activities of software engineering
  - requirement analysis
  - estimation and planning
  - agile methods

Goals

Methods and technique for project management, in particular for software engineering. This lecture deals with the different steps of projects and different types of lifecycles. This lecture can be applied in the Entreprise-drive Project.

Prerequisites

- software development

Manager : Yannick PRIE

Project management 1

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5		3			2

Evaluation

One evaluation : *DS*

Project management 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				3

Evaluation

One evaluation : *Contrôle continu*

Bibliography

Partie analyse du travail : PIERRE VERMERSCH, 1994 « L'entretien d'explicitation », ESF éditeur

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : John KINGSTON

Projet R&D FISA5

Hours

Lect	Tut	PW	Proj	WP	Asst
			100		

Evaluation

2 evaluations :

- *Restitution 1*
- *Restitution 2*

Manager : Marc GELGON

Projet analyse statistique de données FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
		50			

Evaluation

One evaluation : *pratique*

Projet de Séjour international S7 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				

Evaluation

One evaluation : *théorie*

Projet de développement logiciel FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
5		45			

Evaluation

One evaluation : *Projet*

Projet de séjour international

Hours

Lect	Tut	PW	Proj	WP	Asst
	8				

Evaluation

One evaluation : *Evaluation*

Projet de séjour à l'international FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
	8				

Evaluation

One evaluation : *Evaluation*

Quality Security Environment

Hours

Lect	Tut	PW	Proj	WP	Asst
	20				

Evaluation

One evaluation : *QCM + exercices*

Manager : John KINGSTON

Quality, security and environmental approaches (QSE1)

Hours

Lect	Tut	PW	Proj	WP	Asst
	3	3			

Evaluation

One evaluation : *QCM+exercices*

Bibliography

Ressources documentaires disponibles sur madoc :

o Le Code du travail numérique

o Code de l'environnement LEGIFRANCE

o Les aventures de Napo vidéos d'animation INRS pour sensibilisation à la sécurité au travail

o Publications et outils de l'INRS Institut national de recherche et de sécurité

o AIDA : Site web des textes réglementaires du Ministère en charge de l'environnement

o Les fiches sur le fonctionnement des principales institutions de la République, l'organisation de l'Union européenne et les relations internationales

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	✓	·	·	·	·

Manager : John KINGSTON

Quality, security ant environmental approaches (QSE2)

Hours

Lect	Tut	PW	Proj	WP	Asst
	6				

Evaluation

One evaluation : *QCM+exercices*

Bibliography

Références ou ressources documentaires disponibles sur madoc :

- Les fiches sur le fonctionnement des principales institutions de la République, l'organisation de l'Union européenne et les relations internationales
- Publications et outils de l'INRS Institut national de recherche et de sécurité
- Rapports détaillés des accidents industriels sur la base de donnée ARIA
- Outils MARP de Techniques de l'Ingénieur.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	✓	·	·	·	·

Manager : John KINGSTON

Questions éthiques et sociétales en informatique S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
9			10		

Evaluation

One evaluation : *Evaluation*

Manager : Pascale KUNTZ-COSPEREC

Recherche d'information S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
6		12			

Evaluation

One evaluation : *restitution*

Manager : Marc GELGON

Reinforcement learning

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	9				16

Evaluation

One evaluation : *Théorie*

Presentation

This course is an overview of the main non-classical logics that may be used in computer science and its application areas.

Each chapter synthesizes one class of non classical logic, in order to enable students to use this logic. A particular emphasis on business intelligence is given during this course.

Outline

1. Introduction 2. Multivalued and fuzzy logics 3. Inductive Logic Programming 4. Markov Logic

Goals

Today, versatility of the data requires flexible tools tackling such complex structures. First order logic, already studied in the previous year, is used and enriched to produce and learn complex relationships among the data and extract knowledge from it.

Upon completion, the student will be able to use advanced tools of computational logic for knowledge discovery in modern data: big data, relational data, semantic web, etc ...

Bibliography

Priest G. An Introduction to Non-Classical Logic, Cambridge University Press, 2001

Russel S. , Norvig P. Artificial Intelligence : A modern approach, Prentice Hall 2009

Dzeroski, Saso. "Inductive logic programming in a nutshell." Introduction to Statistical Relational Learning [16] (2007).

Prerequisites

Classical logics

Manager : Hoël LE CAPITAINE

Relational Database Management Systems

Hours

Lect	Tut	PW	Proj	WP	Asst
10	10.5	6			17

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Course Introduction
- Object appoach
- Use Case Diagram
- Class Diagram
- Object Diagram, Package Diagram
- Sequence and Communication Diagram
- State machine Diagram
- Activity Diagram
- Component Diagram, Deployment Diagram
- Introduction to OCL
- Conclusion

Goals

This course focuses on learning the concepts and notation of UML modeling language and discusses when to apply which diagram in software development process.

Bibliography

G Booch Conception orientée objet et applications Addison-Wesley, 1992
P-A MullerModélisation objet avec UMLEyrolles, 1997
I Jacobson, G Booch, J Rumbaugh UML en action Addison Wesley 1999
Alistair Cockburn Rédiger des cas d'utilisation e caces [« Writing e ective use cases »]
Eyrolles, 1999 (ISBN 2212092881)
Laurent Audibert UML 2 - de l'apprentissage à la pratique. Ellipse 2009

Manager : Marie-Pierre NACHOUKI

Relational data model

Hours

Lect	Tut	PW	Proj	WP	Asst
5	10.5	6			27

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Relational model: bases
Relational model: Fonctional dependencies
Relational model: Normal forms
Relational model: Relational algebra
Relational model: Futher dependencies
Relational model: Algorithms for relational database design
Relational model: SQL language
Relational model: PL/SQL language
Relational model: : Procédures, functions, packages and triggers
Relational model: Data dictionnary and database authorization

Goals

This course presents an introduction to the modelling through the relational model.The presented concepts are illustrated and implemented through the DBMS Oracle.

Bibliography

Escoffier B., Pagès J. ; Initiation aux traitements statistiques ; Presses universitaires de Rennes, 1997

Rouanet H., Le Roux B., Bert M.-C. ; Statistique en sciences humaines : procédures naturelles ; Dunod, 1987

Tassi P. ; Méthodes statistiques ; Economica, 1985

Saporta G. ; Probabilités, analyse des données et statistique ; Éditions Technip, 1996

Learning outcomes

Learning outcomes	N	A	M	E	O
• Model a data-driven real-world problem	·	✓	·	·	·

Manager : Marie-Pierre NACHOUKI

Research S7

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Antoine GOULLET

Research S8

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Antoine GOULLET

Research and Development Project

Hours

Lect	Tut	PW	Proj	WP	Asst
			150		30

Evaluation

One evaluation : *Pratique*

Goals

The R&D project allows students to discover new requirements and constraints that are unrelated to "standard" applications but understand and take advantage of the state-of-the-art . Without being competitive with a Master of research curriculum, this project aims at providing a glimpse of the creative industrial work either in a R&D department of a big company or in an innovative start-up.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Conduct a scientific state-of-the-art	·	✓	·	·	·
• Devise innovative solutions	·	✓	·	·	·
• Prove the validity of the chosen solution	·	·	✓	·	·
• Evaluate one's own proposals and open new research issues	·	✓	·	·	·

Manager : José MARTINEZ

Research and Development Project - Professional training contract

Hours

Lect	Tut	PW	Proj	WP	Asst
			120		24

Evaluation

One evaluation : *Note PRED*

Goals

The R&D project allows students to discover new requirements and constraints that are unrelated to "standard" applications but understand and take advantage of the state-of-the-art . Without being competitive with a Master of research curriculum, this project aims at providing a glimpse of the creative industrial work either in a R&D department of a big company or in an innovative start-up.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Conduct a scientific state-of-the-art	·	✓	·	·	·
• Devise innovative solutions	·	✓	·	·	·
• Prove the validity of the chosen solution	·	·	✓	·	·
• Evaluate one's own proposals and open new research issues	·	✓	·	·	·

Manager : José MARTINEZ

Rédaction et soutenance PFE

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Réseaux bayesiens S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
10	10				

Evaluation

2 evaluations :

- *théorie*
- *pratique*

Manager : Philippe LERAY

Réseaux de neurones S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
8		9			

Evaluation

2 evaluations :

- *théorie*
- *pratique*

Manager : Marc GELGON

SQL avancé et entrepôts de données - FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
10	3	12			14.5

Evaluation

2 evaluations :

- *Devoir Surveillé*
- *Pratique*

Manager : Guillaume RASCHIA

SSAT FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
	28				

Evaluation

One evaluation : *théorie*

SSAT FISA S8

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

SSAT S10 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
	28				

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

SSAT S9 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
	28				

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Sciences sociales appliquées au travail

Hours

Lect	Tut	PW	Proj	WP	Asst
	28				

Evaluation

One evaluation : *Evaluation*

Sciences sociales appliquées au travail FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				

Evaluation

One evaluation : *Evaluation*

Second foreign language - Japanese

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Japanese

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Sign language

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Sign language

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Spanish

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Spanish

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Security policies

Hours

Lect	Tut	PW	Proj	WP	Asst
10	0.5				6

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Semantic web

Hours

Lect	Tut	PW	Proj	WP	Asst
6	6.5	7.5			9

Evaluation

One evaluation : *Pratique*

Outline

1. introduction

2. Semantic Web: Foundations and challenges. Panorama of languages ??and tools

3. RDF Concepts: Origins of RDF (WWW, XML), motivations, and goals. Metadata descriptions. Terms and predicates. Metadata languages ??(eg Dublin Core Metadata) notations (XML Schema / Notation). Modeling (entity-relationship diagrams, semantic networks, conceptual graphs). Sharing concepts. Vocabulary definition (RDF / S). Syntax, domain terms and relationships. Predefined vocabulary (classes, typing ...). Equivalences between RDF / S and UML.

4. Ontologies and OWL: Defining classes and inferential properties (OWL)

Syntax, definition of inferential properties. Definition of ontologies. Modeling ontologies. Analogies modeling (static) objects.

5. Querying and inference: Exploitation of RDF Web directories, search engines. Querying. XQuery. RQL query descriptions. Inferences (RIL. ..).

7. applications

Analogies with systems based on conventional knowledge (Prolog)

Example: Protégé

Goals

The objective is to present the concepts, language and tools of the Semantic Web. Together, they allow:

to formalize vocabularies and property descriptions;

to create ontologies from these vocabularies;

to process the representations: queries, search for resources and inferences.

Bibliography

Hjelm J. ; Creating the Semantic Web with RDF ; Wiley, 2001

Web Services Essentials ; O'Reilly, 2002, ISBN : 0-596-00224-6

Prerequisites

Ontology modeling

XML language

Prolog

Manager : Fabrice GUILLET

Signal processing

Hours

Lect	Tut	PW	Proj	WP	Asst
5	7.5	9			22.25

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Lectures introduce theoritical fundations, Exercises and labs follows a more illustrative and qualitative approach.

Lecture: signal categories, signal processing stakes, applications, Invariant Linear System, convolution
signal representation: decomposition, fourier transform
sampling: shannon theorem, spectral analysis

Exercises: convolution, linear filtering, sampling, Discrete fourier Transform, over sampling, sub band analysis

labs: introduction to Matlab, sampling, 1D signal linear filtering, 1D signal spectral analysis, 2D signal spectral analysis, introduction to 2D signal filtering

Goals

This first signal processing course presents the minimal concepts to understand mainly digital signal processing. The course should help the students to start in good conditions following multimedia courses. Student should quickly use intuitive thinking without depoying long and complex calculutus.

Prerequisites

Course in Mathematics for Engineer

Manager : Vincent RICORDEL

Socio-economic debates and Tools for shifting

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				10

Evaluation

One evaluation : *Exposé débat*

Bibliography

De nombreuses références seront proposées dans chacun des 6 thèmes (liens vidéos, articles et livres) ; quelques livres de base peuvent cependant servir à tous les thèmes :

- BRAQUET Laurent et MOUREY David, Comprendre les fondamentaux de l'économie, De Boeck, 2015, 475 p., ISBN 978-2-8041-9021-7
- BIASUTTI Jean-Pierre et BRAQUET Laurent, Les débats économiques d'aujourd'hui, Ellipses, 2019, 278p, ISBN 9782340-031210
- DESCAMPS Christian, L'analyse économique en questions, Vuibert, 2005, ISBN 2-71117-7413-9
- SINAÏ Agnès, Penser la décroissance, Sciences Po Les presses, 2018, 210 p, ISBN 9782724613001
- SINAÏ Agnès, Economie de l'après-croissance, Sciences Po Les presses, 2018, ISBN 9782724617559
- PIKETTY Thomas, Capital et idéologie, Seuil, 2019, ISBN 978-2-02-133804-1
- COHEN Daniel, Le monde est clos et le désir infini, Albin Michel, 2015, ISBN 978-2226240293

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-8	✓	·	·	·	·
• TPN-9	✓	·	·	·	·
• TPN-10	·	✓	·	·	·
• TPN-11	✓	·	·	·	·

Manager : Chrystèle GONCALVES

Soft skills

Hours

Lect	Tut	PW	Proj	WP	Asst
	7.5				

Evaluation

One evaluation : *Examen:cas pratique*

Bibliography

- La confiance en gestion : un regard pluridisciplinaire (Boissieu & Oguchi, 2011)
- Trust Rules: How the World's Best Managers Create Great Places to Work (Lee, 2017)
- Give and Take: A Revolutionary Approach to Success (Grant, 2013)
- L'entreprise une affaire de don (Collectif, 2016)
- La théorie des jeux - Science étonnante
- Jeu sur l'évolution de la confiance
- The Office (NBC, 2005)
- Mad Men (HBO, 2007)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-13	✓	·	·	·	·
• TPN-20	✓	·	·	·	·
• TPN-21	✓	·	·	·	·

Manager : Roland BESSENAY

Software design patterns

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	6	13.5			20

Evaluation

One evaluation : *Examen*

Presentation

In this class, we deal with the design patterns and the Model View Controler architecture. To describe this class, here are the introductions of their Wikipedia page. First, the design pattern concept :

In software engineering, a software design pattern is a general, reusable solution to a commonly occurring problem within a given context in software design. It is not a finished design that can be transformed directly into source or machine code. Rather, it is a description or template for how to solve a problem that can be used in many different situations. Design patterns are formalized best practices that the programmer can use to solve common problems when designing an application or system.

Object-oriented design patterns typically show relationships and interactions between classes or objects, without specifying the final application classes or objects that are involved. Patterns that imply mutable state may be unsuited for functional programming languages. Some patterns can be rendered unnecessary in languages that have built-in support for solving the problem they are trying to solve, and object-oriented patterns are not necessarily suitable for non-object-oriented languages.

Design patterns may be viewed as a structured approach to computer programming intermediate between the levels of a programming paradigm and a concrete algorithm.

Second, the Model View Controler page :

Model-view-controller (MVC) is a software architectural pattern commonly used for developing user interfaces that divide the related program logic into three interconnected elements. This is done to separate internal representations of information from the ways information is presented to and accepted by the user.

Traditionally used for desktop graphical user interfaces (GUIs), this pattern became popular for designing web applications. Popular programming languages have MVC frameworks that facilitate the implementation of the pattern.

References :

https://en.wikipedia.org/wiki/Software_design_pattern

https://en.wikipedia.org/wiki/Model-view-controller

Outline

1. Introduction to design pattern
   2. Behavioral pattern
   3. Structural pattern
   4. Creational pattern
   5. MVC pattern

Goals

To know an object programming language does not imply knowing how to implement a program correctly. It is also necessary to provide maintainable and upgradable modeling. Design pattern aims to provide elegant modeling solutions for common problems.

The goals are :

- Discover the design patterns
- Discover the MVC pattern

- Implementation of some patterns
- Improve the modeling skills in object programming

Bibliography

Design patterns, Eric Freeman, Editeur : O'Reilly Editions (22 septembre 2005)

Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, , Richard Helm, Ralph Johnson, John Vlissides, Addison-Wesley professional computing series

Prerequisites

Basic Software Engineering

Object programming

UML

Learning outcomes

Learning outcomes	N	A	M	E	O
• Implement some complex design pattern	·	✓	·	·	·
• Understand complex modelling	·	·	✓	·	·

Manager : Antoine PIGEAU

Software testing, integration and delivery

Hours

Lect	Tut	PW	Proj	WP	Asst
3	1.5	3			

Evaluation

One evaluation : *théorie*

Manager : Marc GELGON

Spatial and temporal databases

Hours

Lect	Tut	PW	Proj	WP	Asst
5	1	3			3

Evaluation

One evaluation : *Théorie*

Manager : Antoine PIGEAU

Statistical Processing of Information 2

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5	10.5			10

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

To use exploratory and inferential statistics methods:
- To deepen the concepts and methods for estimation and hypothesis tests.
- To study the concepts and methods for bidimensional data analysis.
- To study simple and multiple linear regression.
- To put knowledge into practice via practical sessions with the statistical program R.

Outline

Estimation and hypothesis tests
Unidimensional data analysis
Bidimensional data analysis
Introduction to simple and multiple linear regression

Goals

To carry out a basic statistical analysis on a dataset in order to extract main tendencies, identify spurious phenomena, and model relations between numerical variables.

Bibliography

Gilbert SAPORTA - "Probabilités, analyse des données et statistique" - Technip, 2006, 2e édition
Patrick BOGAERT - "Probabilités pour scientifiques et ingénieurs" - De Boeck, 2005
Gaël MILLOT - "Comprendre et réaliser les tests statistiques à l'aide de R" - De Boeck, 2009

Prerequisites

Notions in probability theory.

Manager : Julien BLANCHARD

Statistical processing of information 1

Hours

Lect	Tut	PW	Proj	WP	Asst
10	10.5				28.75

Evaluation

One evaluation : *Théorie*

Learning outcomes

Learning outcomes	N	A	M	E	O
• c1	✓	·	·	·	·
• c2	·	✓	·	·	·
• c3	·	·	✓	·	·

Manager : Pascale KUNTZ-COSPEREC

Statistiques et probabilités FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
15	15		15		

Evaluation

One evaluation : *Evaluation*

Structured documents and NoSQL

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5	9			8

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

The course presents recent trends in storage systems, from both data models, architectures and query facilities point of views. We especially focus on large scale storage systems based on sharding techniques and eventual consistency. The second track deals with several extensions of the relational model among which trees, graphs and objects as basic data structures in the storage system. By the way, we carrefully study query languages and systems dedicated to those new storage systems.

Outline

1. Tree models and XML-relational mapping - inlining and nested sets
2. Nested relations - NF2, eNF2, PNF
3. Objects and graphes - Object-Relational Mapping
4. Overview of the NoSQL galaxy - CAP, BASE, MapReduce
5. Foundations of NoSQL - DHT, 2PC, Vector Clocks
6. Case study

Goals

At the end of the course, students will be able to understand complexity and variety of modern storage systems, to guide design choices to meet storage and query requirements of a given problem, and to set up an architecture to process massively distributed data.

Bibliography

H. Garcia-Molina, J.D. Ullman and J. Widom. "Database Systems - The Complete Book" Prentice-Hall, 2008, 2nd edition

S. Abiteboul, R. Hull and V. Vianu "Foundations of Databases" Addison-Wesley, 1995

S. Abiteboul, I. Manolescu, P. Rigaux, M.-C. Rousset, P. Senellart. "Web Data Management" Cambridge University Press, 2011

Prerequisites

Relational Model

Implementation of Databases

Architecture of Databases

Logic

XML Technologies

Manager : Guillaume RASCHIA

Sustainable development and social responsability 1

Hours

Lect	Tut	PW	Proj	WP	Asst
1.5	13.5				

Evaluation

One evaluation : *Grille d'évaluation*

Bibliography

- Travaux du GIEC
- Global carbon project

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·

Manager : Laurence CHARPENTIER

Sustainable development and social responsability 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	9				10

Evaluation

One evaluation : *Soutenance + Rapport*

Bibliography

- Travaux du GIEC
- Global carbon project

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	·	✓	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Laurence CHARPENTIER

System and cloud administration

Hours

Lect	Tut	PW	Proj	WP	Asst
3		12			13

Evaluation

One evaluation : *Théorie*

Presentation

Administration of Windows et Unix operating systems
Initiation to Openstack

Outline

Windows System Administration : workstations and servers
Unix system administration (evaluation of the desktop)
Openstack

Goals

Autonomous exploitation of Unix and Windows operating systems.
Good administration of my computer in D012 (network labs room).

Prerequisites

Unix and Windows systems usage.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Linux Operating system upgrade	·	·	·	✓	·
• Partition management of a machine	·	·	·	✓	·
• Users management	·	·	·	✓	·
• Advanced administration (Openstack framework)	·	✓	·	·	·

Manager : Rémi LEHN

Systèmes informatiques FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
12		18			12

Evaluation

One evaluation : *Evaluation*

Systèmes transactionnels FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
6.5	4	3			

Evaluation

One evaluation : *théorie*

Manager : Guillaume RASCHIA

Techniques de base de l'IA - FISA S7

Hours

Lect	Tut	PW	Proj	WP	Asst
10	6		3		

Evaluation

One evaluation : *théorie*

Manager : José MARTINEZ

Technologies du web FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
10		20			

Evaluation

One evaluation : *Evaluation*

Temporal data

Hours

Lect	Tut	PW	Proj	WP	Asst
5	1	6			6

Evaluation

One evaluation : *Théorie*

Outline

1- Introduction on temporal DB
2- Temporal DB model
3- Temporal query
4- Temporal index

Goals

Data storage can present difficulties when they have temporal properties: data evolving temporally or traces of events, where each event of the trace is dated. This type of data can be encountered in many areas.

For data evolving temporally, examples are the financial domain (stock values), the medical field (cancer evolution)

or the scientific field (meteorological data). Trace generation is related to the digitalization of companies, with a continuous data generation: each application

is likely to generate its traces. A field of application for this type of data is process mining, with the aim to

study the business processes performed by the employees or to detect fraud.

The objective of the course is to present the following technologies:

- temporal database
- methods for trace storage

Bibliography

Philippe Rigaux, Michel Scholl, Agnes Voisard
Spatial Databases, with application to GIS.
Morgan Kaufmann; 1 edition (June 1, 2001)
Claramunt, Christophe and Th eriault, Marius
Managing Time in GIS: An Event-Oriented Approach.
Proceedings of the International Workshop on Temporal Databases: Recent
Advances in Temporal Databases, 1995.
Christian S. Jensen , Richard T. Snodgrass , Michael D. Soo
The TSQL2 Data Model.
The Springer International Series in Engineering and Computer Science, Vol. 330
Canan Eren Atay
A Comparison of Attribute and Tuple Time Stamped Bitemporal Relational Data
Models.
Proceedings of the International Conference on Applied Computer Science, 2010.
Wil M.P. van der Aalst
Process Mining, Discovery, Conformance and Enhancement of Business Processes.
Springer, 2011.

Prerequisites

Relational data model
    Database Infrastructure
    Database implementation

Manager : Antoine PIGEAU

Textual information retrieval

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	6				10

Evaluation

One evaluation : *Théorie*

Outline

Introduction: Short history, definitions and principles, efficacity measures
Conceptual Models: Booleans, vectorials, and probabilistic models
Text Indexing: Statistical and manual indexing

Goals

Information Retrieval is mostly used for text retrieval, under various environments, and most visibly on the Web.

Introducing the querying models as well as the tools and techniques to index texts allows one to understand the limitations of the models, hence to better use them, and possibly to adapt a given system to a domain specific need.

Bibliography

Baëza-Yates R., Ribeiro-Neto B. (Ed.) ; Modern Information Retrieval ; Addison Wesley Longman

Prerequisites

Data Modelling and Data Structures; Notions of Logic, Probabilities and Vectorial Calculus; Algorithmics; Text and Multimedia Data Processing

Manager : José MARTINEZ

Théorie des graphes FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
10	10				10

Evaluation

2 evaluations :

- *DS*
- *carnet*

Toeic

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				

Evaluation

2 evaluations :

- *CC*
- *DS*

Toeic & Professional English

Hours

Lect	Tut	PW	Proj	WP	Asst
	22.5				10

Evaluation

2 evaluations :

- *CC*
- *DS*

Toeic & public speaking

Hours

Lect	Tut	PW	Proj	WP	Asst
	22.5				10

Evaluation

2 evaluations :

- *CC*
- *DS*

Tools for Software Development

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5		8			0.5

Evaluation

One evaluation : *Pratique*

Outline

Lecture : Foudations of program analysis
- Practical work 1 : Static analysis
- Practical work 2 : proof of correctness and termination
- Practical work 3 : management of dependancies and build rules
- Practical work 4 : management of versions.

Goals

Software development takes place in a tool ecosystem with different purposes : managing the build of the system, managing its quality, managing the simultaneous edition of its source code, managing the evolutions of its source code, etc.

The goal of this course is to undersand the principles of some of these tools and to be able to configure and use them.

Prerequisites

Imperative programming (C)

Learning outcomes

Learning outcomes	N	A	M	E	O
• Use a static analysis tool to detect common problems in source code.	·	✓	·	·	·
• Prove that a program is correct with respect to its specification.	·	✓	·	·	·
• Prove that a program terminates (loops, recursion).	·	✓	·	·	·
• Configure a build system (Gnu Make)	·	✓	·	·	·
• Configure a version control system (SVN or GIT)	·	✓	·	·	·
• Know good and bad practices with version control systems.	✓	·	·	·	·

Manager : Julien COHEN

Training for Toeic

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Training for Toeic

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Traitement de requêtes FISA S6

Hours

Lect	Tut	PW	Proj	WP	Asst
9.5	8.5	3			

Evaluation

One evaluation : *théorie*

Manager : Guillaume RASCHIA

Transaction processing

Hours

Lect	Tut	PW	Proj	WP	Asst
6.5	4	3			19

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Presentation

This course gives an overview of a fundamental building block of relational database management systems, that is concurrency control and failure recovery mechanisms. Those are key elements of the DBMS that guarantee consistency and reliability.

Outline

ACID properties - Serialisability - Locking Protocols - Alternative Protocols - Distributed Transactions - Logs and Failure Recovery

Goals

Following on the database systems track of knowledge, we study here transaction management. The main purposes are to:

- understand requirements and solutions for preserving data consistency during concurrent write operations;
- practice those ideas in SQL
- control the degree of consistency vs. performance that is well-fitted to a given problem
- understand mechanisms of failure recovery

Bibliography

H. Garcia-Molina, J. Ullman, J. Widom. "Database Systems : The Complete Book" Prentice Hall, 2008, (2nd edition)

A. Silberschatz, H. F. Korth, S. Sudarshan. "Database System Concepts" Mc Graw Hill, 2010, (6th ed)

Prerequisites

Relational Model

Architectures of Database Systems

Manager : Guillaume RASCHIA

Transition Engineering and Interdisciplinarity S7

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Bruno AUVITY

Transition Engineering and Interdisciplinarity S8

Hours

Lect	Tut	PW	Proj	WP	Asst
			32		

Evaluation

One evaluation : *Evaluation*

Manager : Bruno AUVITY

Travail en entreprise FISA S10

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *Evaluation*

Manager : Marc GELGON

Virtualization

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5	1	6			4

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Outline

Introduction
- Userland kernel
- Application isolation
- Machine emulation
- Hypervisors

Goals

Designing virtualized services and deploying virtual machines

Bibliography

Soufiane Rouibia, « Environnements virtuels », support de cours

Prerequisites

Good practice of operating systems

Manager : Rémi LEHN

Visualisation d'information IDIA5

Hours

Lect	Tut	PW	Proj	WP	Asst
5	5		3		

Evaluation

One evaluation : *Travaux à rendre*

Manager : Marc GELGON

Web Technologies

Hours

Lect	Tut	PW	Proj	WP	Asst
16.25	1.5	12			8

Evaluation

2 evaluations :

- *Théorie*
- *Pratique*

Manager : Rémi LEHN

Web semantic application and experiences

Hours

Lect	Tut	PW	Proj	WP	Asst
1.25		9			11

Evaluation

One evaluation : *projet*

Web semantique S8 FISA

Hours

Lect	Tut	PW	Proj	WP	Asst
7	7	12			

Evaluation

One evaluation : *Evaluation*

Web services and interoperability

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	1	6			6

Evaluation

One evaluation : *Théorie*

Outline

Introduction
    Information system definition
    Integration service roles

Goals

Urbanization consists to organize the progressive and continue evolutions of the information system in order to simplify it, to optimize its performance, and to improve its reactivity and flexibility in relation to the business strategy of the enterprise, while relying on the available technologies on the market.?. The goal of this class is then to present an architecture enterprise process with its associated tools.
    The goals are:
    - the modelling of the system architecture
    - the application interoperability methods

Bibliography

Intégration Applicative EAI, B2B, BPM et SOA, Bernard Manouvrier, Laurent Ménard, Hermès 2007
    Urbanisation de BPM, Yves Caseau, DUNOD, 2006
    Urbanisation et modernisation du SI, Bernard Le Roux, LucDesbertrand, Pascal Guerif et Xavier Tang, Hermès 2004
    Le projet d'urbanisation du S.I., Christophe Longépé
    Le système d'information transverse, François Rivard, Georges Abou Harb, Philippe Meret
    BPM Business Process Management, Bernard Debauche, Patrick Mégard

Prerequisites

Software engineer
    Application development

Manager : Antoine PIGEAU

activité en entreprise S8 FISA

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *pratique*

Manager : Marc GELGON

conversational agents

Hours

Lect	Tut	PW	Proj	WP	Asst
1.25		9			8

Evaluation

One evaluation : *Pratique*

Manager : Guillaume RASCHIA

iCreate : Interdisciplinarity, CREAtion, TEchnology

Hours

Lect	Tut	PW	Proj	WP	Asst
			23		27

Evaluation

3 evaluations :

- *Présentation*
- *Rapport de projet*
- *Rendu du code*

Outline

Coming soon...

Prerequisites

- XML and web technologies
  - Programming
  - Image and signal processing
  - Human Computer Interaction
  - Project management

Learning outcomes

Learning outcomes	N	A	M	E	O
• Multimedia data processing	·	✓	·	·	·
• Human computer interaction	·	✓	·	·	·
• Project management	·	✓	·	·	·
• Graphic and space design	✓	·	·	·	·
• Communication / collaboration with other disciplines	·	✓	·	·	·

Manager : Matthieu PERREIRA DA SILVA