

QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department
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Study plan No.	2020/2021	University Specialization	Artificial Intelligence
Course No.	0142335	Course name	Information Retrieval
Credit Hours	3	Prerequisite Co-requisite	Introduction into Data Science
Course type	<input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS	<input type="checkbox"/> FACULTY MANDATORY REQUIREMENT <input type="checkbox"/> Support course family requirements	<input type="checkbox"/> Mandatory requirements <input checked="" type="checkbox"/> Elective requirements
Teaching style	<input type="checkbox"/> Full online learning	<input type="checkbox"/> Blended learning	Traditional learning
Teaching model	<input type="checkbox"/> 2Synchronous: 1asynchronous	<input type="checkbox"/> 2 face to face : 1synchronous	3 Traditional

Faculty member and study divisions information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of students	Teaching style	Approved model

Brief description

This course includes the following topics:
Introduction to Information Retrieval, Basic Techniques of information retrieval, Tokens and Terms, Static Inverted Indices, Query Processing, Index Compression, Dynamic Inverted Indices, Probabilistic Retrieval , Measuring Effectiveness, Web Search, Advanced Information Retrieval Topics.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	1- Stefan Buttcher, Charles Clarke, and Gordon Cormack. Information Retrieval: Implementing and Evaluating Search Engines. MIT press, 2016.				
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1- <u>Winfried Gödert</u> , <u>Jessica Hubrich</u> , <u>Matthias Nagelschmidt</u> . Semantic Knowledge Representation for Information Retrieval. De Gruyter Saur. 2014				
	2-Louis Rosenfeld and Peter Morville. Information Architecture: For the web and beyond. O'Reilly Media; 2015.				
Supporting websites					
The physical environment for teaching	Class room	<input type="checkbox"/> labs	<input type="checkbox"/> Virtual educational platform	<input type="checkbox"/> Others	

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Necessary equipment and software	
Supporting people with special needs	
For technical support	

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

No.	Course learning outcomes	The associated program learning output code
Knowledge		
K1	To be able to show a good comprehension to the basic concepts of IR.	MK3
K2	To be able to show a good understanding of the different types of retrieval.	MK3
K3		
Skills		
S1	To be able to demonstrate how inverted index works.	MS3
S2	To be able to draw the basic types of indexes	MS3
S3		
Competences		
C1	To use the concepts of indexing in solving real life problems	MC1

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
First exam	0	0	%20	0
Second / midterm exam	%30	%30	%20	30%
Participation / practical applications	0	0	10	30%
Asynchronous interactive activities	%30	%30	0	0
final exam	%40	%40	%50	40%

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style*	Reference **
1	Introduction To information Retrieval, IR systems, Test	Lectures	1-33

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	collections.		
2	Inverted Indices, Retrieval and Ranking, Evaluation.	Lectures	33-84
3	Characters, N-Grams, European Languages.	Lectures	84-104
4	Index Components and Index life cycle, The dictionary, Interleaving Dictionary, Index Construction.	Lectures	104-137
5	Query processing for ranked retrieval, Lightweight structure.	Lectures	137-171
6	Mid Exam Estimated + Revision	learning through problem solving	
7	General purpose data compression, symbol wise compression, compressing posting lists, compressing dictionaries.	Lectures	174-228
8	Batch Updates, Incremental Index Update, Document Deletion, Document Modification.	Lectures	228-254
9	Modeling Relevance, Robertson Weighting Formula, Term Frequency, Field weighting.	Lectures	258-282
10	Generating queries from documents, language models and smoothing, ranking with language models, passage retrieval and ranking.	Lectures	286-306
11	Various types of classifiers.	Lectures	310-371
12	Traditional effectiveness measures, TREC, Using statistics, Nontraditional measures	Lectures	406-463
13	Web structure, web crawler, Page Rank Algorithm, Evaluating Web Search	Lectures	507-522
14	Case Study 1	learning through problem solving	
15	Presentations.	participatory learning	
16	Final Exam		

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Term Document Matrix		To be able to create the term document matrix from a given small collection

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2	Inverted Index		To draw the inverted index of a given small collection
3	Preprocessing 1		To apply preprocessing techniques on a given collection
4	Preprocessing 2		To apply preprocessing techniques on a given collection
5	Biwords and Positional Index		To draw both byword index and positional index
6	Mid Exam		Case studies
7	Ranked Retrieval – Jaccard		To rank query results based on Jaccard similarity
8	Ranked Retrieval – TF.IDF		To rank query results based on TF.IDF similarity
9	Spelling Error Correction 1		To demonstrate how errors are found and corrected
10	Spelling Error Correction 2		To demonstrate how errors are found and corrected
11	Wild Card Queries		To use biword index and positional index in wild card queries
12	Page Rank 1		To apply page rank to order results
13	Page Rank 2		To apply page rank to order results
14	Case Study		Case study
15	Presentations		presentation
16	Final Exam		