Universidade do Minho
Escola de Engenharia

Carlos Vicente da Silva Nunes

A Machine Learning Taxonomic Classifier for Science Publications

Master dissertation

Integrated Master's in Engineering and Management of Information Systems

Dissertation supervised by

Jorge Vaz de Oliveira e Sá, Ph.D.

October 2020

ACKNOWLEDGMENTS

I thank my friends, professors and family.

Thank you, my friends, for being trustful companions on this journey, for the support and for all the learnings I take from you. Your younger view of the world, free from established paradigms, frequently opened my mind to see what I could not see. You all started as school mates, but I take some of you as my friends for life. And thank you, longtime friends before university, at work or otherwise, you were there every day making sure I could free my mind from work and other life related complications and focus only on the tasks in-hand. You were my relief at the cost of extra work for yourself.

Thank you, professors, for being so patient when dealing with different learning speeds and personalities. I found in you many excellent professionals and human beings along this short academic life. Special thanks to you, Professor Jorge Oliveira Sá, for being there all this time even when I did not reach for help, just knowing you were there eased my mind and made things less complicated.

Thank you, family, specially you Sandra my sweet, dear and patient wife, for believing in me. For being the light in the foggy nights. Whenever I thought about turning around, just the thought of you and the promised I made to both of us, was enough to keep me going. Well, that and many cups of coffee...

I would like also to thank Paulo Cunha, a fellow researcher that provided the dataset used in the ML part of this work, and to Rosemary Fantinel, skilled librarian researcher, for the comprehensive dataset with all the publications of the Algoritmi Center manually classified.

I deeply thank you all and will be forever in your debt.

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

RESUMO

A evolução na produção de ciência, associada à crescente colaboração interdomínios do conhecimento e à também crescente coautoria de trabalhos permanece suportada por processos de classificação manual, subjetiva e sujeita a interpretações erradas. A própria taxonomia na qual assenta esse mesmo processo de classificação não é consensual, com organismos estatais a recorrerem a taxonomias que não acompanham as alterações nas áreas científicas, e indexadores/repositórios que procuram acompanhar essas mesmas alterações.

Verificamos uma realidade distinta do espectável e que os domínios onde são registados os trabalhos científicos podem facilmente estar desenquadrados.

A taxonomia hoje aplicada pelos organismos governamentais, como o caso do organismo que regulamenta a produção científica em Portugal, não é suficiente, é limitadora, e promove a classificação em domínios aproximados do desejado, logo com grande potencial para erro.

Um processo de classificação automática com base em algoritmos de *machine learning* apresenta-se como uma possível solução para o problema da subjetividade na classificação, e embora não resolva a questão do desenquadramento da taxonomia utilizada, é apresentada neste trabalho como uma possibilidade comprovada.

Neste trabalho propomos uma taxonomia de classificação, bem como nós desenvolvemos um processo baseado em *machine learnin*g algoritmos para resolver o problema de classificação. Apresentamos ainda um conjunto de direções para trabalhos futuros para uma classificação cada vez mais representativa da evolução nas ciências, que não pretende ser hermética, mas flexível e talvez cada vez mais baseada em fenómenos e não apenas em disciplinas.

PALAVRAS-CHAVE

Data Mining, Machine Learning, Taxonomia, Ciência, Classificação

Abstract

The evolution in scientific production, associated with the growing interdomain collaboration of knowledge and the increasing co-authorship of scientific works remains supported by processes of manual, highly subjective classification, subject to misinterpretation. The very taxonomy on which this same classification process is based is not consensual, with governmental organizations resorting to taxonomies that do not keep up with changes in scientific areas, and indexers / repositories that seek to keep up with those changes.

We find a reality distinct from what is expected and that the domains where scientific work is recorded can easily be misrepresentative of the work itself.

The taxonomy applied today by governmental bodies, such as the one that regulates scientific production in Portugal, is not enough, is limiting, and promotes classification in areas close to the desired, therefore with great potential for error.

An automatic classification process based on machine learning algorithms presents itself as a possible solution to the subjectivity problem in classification, and while it does not solve the issue of taxonomy mismatch this work shows this possibility with proved results.

In this work, we propose a classification taxonomy, as well as we develop a process based on machine learning algorithms to solve the classification problem. We also present a set of directions for future work for an increasingly representative classification of evolution in science, which is not intended as airtight, but flexible and perhaps increasingly based on phenomena and not just disciplines.

Keywords

Data Mining, Machine Learning, Taxonomy, Science, Classification

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

List of Acronyms

AI – Artificial Intelligence

API – Application programming interface

CAlg – Centro Algoritmi

FCT – *Fundação para a Ciência e Tecnologia* (Foundation for Science and Technology)

ISBN – International Standard Book Identifier

KDD – Knowledge Discovery in Databases

KDT – Knowledge Discovery in Texts

KOS – Knowledge Organization Schemes

ML – Machine Learning

NB – Naïve Bayes

NLP – Natural Language Processing

NLU – Natural Language Understanding

POS – Part-of-Speech

R&D – Research and Development

RNN – Recurrent Neural Networks

SKO – Scientific Knowledge Objects

SKOS – Simple Knowledge Organization System

SVC – Support Vector Classifier

SVM – Support Vector Machines

SGD – Stochastic gradient descent

TF – Term frequency

TF-IDF – Term frequency times inverse document frequency

WoS – Web of Science

1. INTRODUCTION

1.1 Background, justification and motivation

1.1.1. Classification in general

The grouping of items based on their features or characteristics is what a classification system is about. As humans, we learn to classify things at very young age, as it fills a very human need to impose order on nature and find hidden relationships, but we are not very good at it and, for example, the reason why a tomato is often classified as a fruit is mostly due to the fact most of us do not know what characteristics distinguishes a fruit from a vegetable and, therefore, we classify empirically, based on intuition or past experience.

It is quite simple thought to classify a set of ten black and white balls into two classes: black and white. But as we increase the number of characteristics so does the complexity of the task but we struggle because classification allows us to understand diversity better.

To classify, we need:

- a list of classes where each of the items to be classified falls indubitably into a single class, or taxonomy that also provides hierarchical grading.
- knowledge of the classification system's rules or process. This would be a commonly agreed set of principles of how this classification should be done.
- data or evidence from the analysis of the object under classification.

1.1.2. Classification of text base on its content

A Text Classifier is an abstract model, which describes a set of predefined classes, generated from a collection of labeled data or training set. The classifier is used to properly classify new texts for which the class label is unknown (Kotsiantis et al., 2007).

Real-world raw data is commonly unsuitable for direct use in a classifier training, so some cleaning and preprocessing steps are usually applied before the classification task.

Good results can be achieved on a dataset with a combination of corpus-based features and lexical-based features using Support Vector Machine (SVM) for sentiment analysis (Aman & Szpakowicz, 2008). The corpus-based features exploit the statistical characteristics of the data. Since the goal of this work is not to do a sentiment analysis, a simple corpus-based features should provide good starting results.

Classification in science adds several challenges, some of which can result of biased models when we try to understand feature like:

- The authors research groups affiliation
- The co-authors domains off expertise
- The actual content of the document. It's sometimes classified into an existing class even when it does not fit in the case of an emerging research field.
- The person that decides the classification can be either the author, the designated person who submits the publication, or a committee of pears.

With the increase in publications, the human factor, especially under pressure of numbers or overload of information, is most likely to make mistakes and fail to identify correctly and consistently. People are often prone to errors during analysis or when trying to establish relationships between multiple features.

Machine learning can be applied to solve or mitigate these problems, while improving efficiency.

1.2 Interdisciplinarity: phenomena vs discipline,

Frodeman and Klein (2012) have a comprehensive research on interdisciplinarity where they identify the surge of new disciplines in the interdisciplinarity cycle (Frodeman & Klein, 2012) represented on Figure 1 as a graphical representation of interdisciplinary or emergent disciplines providing a clue as what a Taxonomy should be able to handle when mirroring the real world: interdisciplinary cross-fertilization.

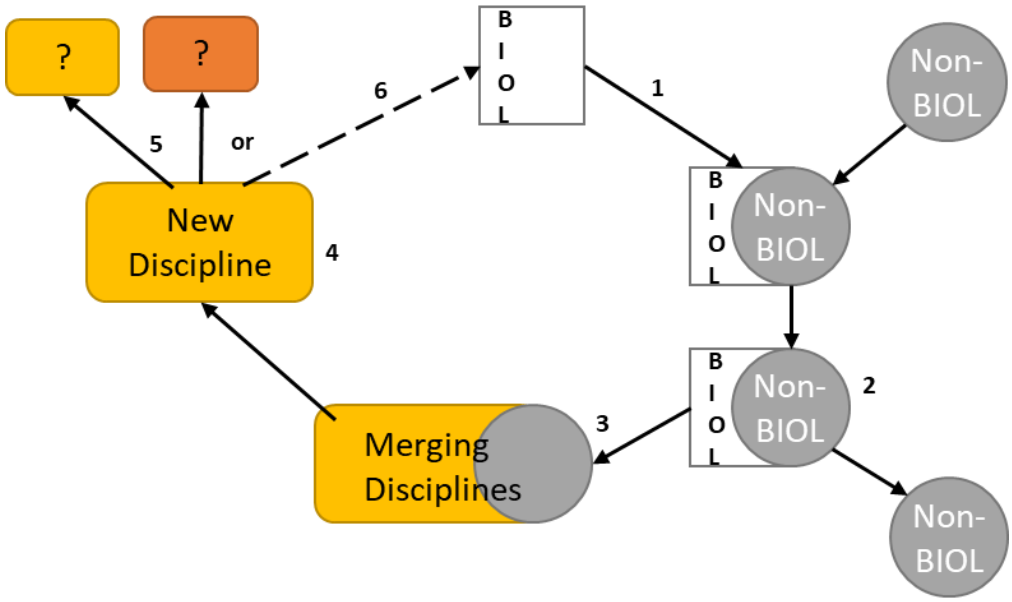


Figure 1 – The interdisciplinarity cycle

Adapted from: (Frodeman & Klein, 2012)

Steps in the interdisciplinary cycle according to Frodeman & Klein (Figure 1):

1. A free-standing discipline such as biology regularly experiences the influence of non-biological disciplines.
2. This co-mingling of ideas and techniques can ultimately be only fleeting
3. or it can result in a true merger of the disciplines
4. This new discipline, formed from the merger of biology and non-biology
5. may eventually fragment into new disciplines
6. or can persist to enter the interdisciplinarity cycle once again

An alternative approach was defended by Szostak who supported the need for a universal classification of scholarly documents based in the phenomena that scholars study together with the theories and methods they apply (Szostak, 2008). This author was also an important driver for the "Leon manifesto" where he presented an alternative based in the ILC notation scheme (*Leon Manifesto*, 2007), in opposite to traditional discipline-based classification systems.

1.3 Problem and opportunity

From the discussion with members of the academic community, it was possible to identify the need to improve classification, reducing errors and labor and simultaneously increase depth or detail in the classification.

Furthermore, the possibility to graphically visualize the cross-knowledge-domain phenomena suggested by Frodeman & Klein, would provide useful insights to support strategic planning, goal setting and norms for the academic community to enforce the results of these affinities in the creation of science.

Since by the time of the start of the project, as far as we could know, there was no tool available to provide this level of insight on data, these needs were then conceptualized into the following block diagram (Figure 2). This was our problem:

"How to provide a tool to the academic community that could gather existing data, interpret such data, classify it, and provide graphical insight in multiple dimensions."

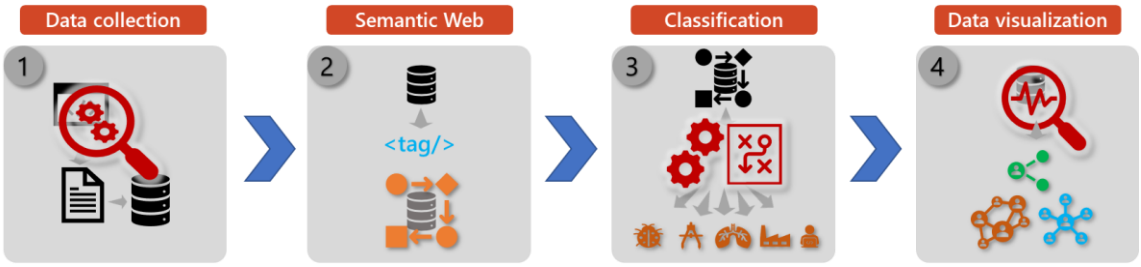


Figure 2 - Model representation for the broader problem

The project team divided the problem into 4 blocks with the following objectives:

1. How to collect, efficiently and effectively the information available in the distinct repositories? What techniques would be best suited for such tasks depending in the repository available interfaces: web-crawling, web-scrapping, API querying, others?
2. With the collected data what would be the best suited process to obtain the ontology in that data to make it machine readable, using Semantic Web techniques?
3. Using the data from the points 1 and 2, would it be possible to properly classify the publication using Machine Learning? What would be the process to apply ML techniques and provide a working model?

4. The analytics, with the goal to provide visualization tools and models capable to allow pattern interpretation in relation to affinities.

A local research center is expected to present the same problems and opportunities, shared-publications growth rate, classification errors, etc., and this would represent a good opportunity to test the method in a more controlled environment as we could get inputs from the authors very fast, and the access to publications would not represent a problem.

This was then our "opportunity": to run a test Case with the scope narrowed down to a local Research Center data to test the solution to this part of the problem.

The expectation was that, in the end, a proven use of machine learning to improve the classification of scientific research material would be provided as base for continuous improvement for complete solution implementation.

A few critical uncertainties were:

- the availability of good data to train the models,
- good understanding of the rules in place to evaluate the taxonomy in place,
- good ontological metadata to for a classification mechanism based on Web Semantics,
- understanding the specifics of natural language text classification and associated methods and tools.

At the end of the first cycle:

× The taxonomy in place is shallow allowing for multiple grey areas for classification or the possibility to classify in more than one domain
× Data availability was poor and slowly available
× No ontology metadata was ever made available

This forced us to follow a more traditional approach of Machine Learning, but including Natural Language Processing techniques to improve accuracy and provide an improved starting point for the next iteration, if adding web semantics data to the dataset would be a completed step in the broader project.

1.4 Methodology

The research methodology adopted was Action Research as the subject of experience was a real-life problem/situation (O'Brien, 1998). According to the same author it is chosen when the circumstances requires flexibility. In this case, the subject of research areas classification was a new field for me and the need to get collaboration with other researchers was foreseen at the beginning of the project mostly to guarantee there was enough data to implement a classification model.

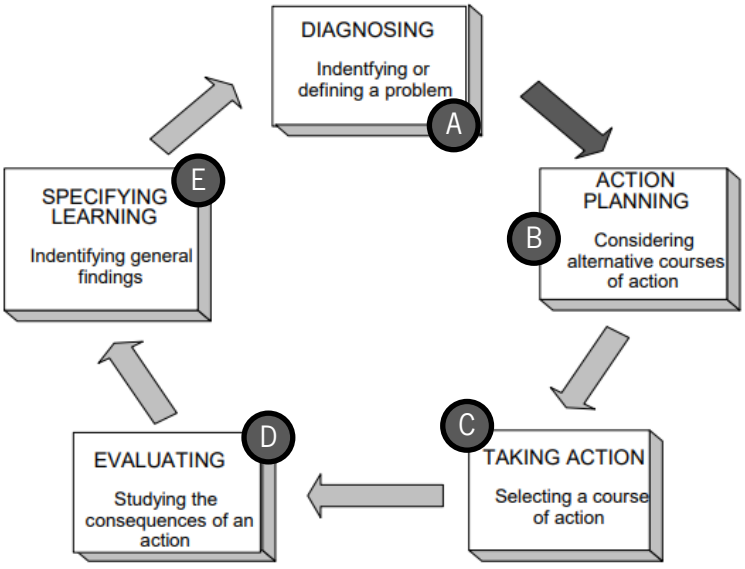


Figure 3 – Action Research Model

From: (O'Brien, 1998)

A. Identifying a real-life problem to solve

The problem identification was simple as it was delivered as a real need for improvement, but its definition: scope, stakeholders, AS-IS state, were important to understand the problem properly.

B. Get organizational agents needs and perspective

Getting the stakeholders' perspective on the process of classification of research papers was fundamental to not only understand the real dimension of the problem but to also understand that reality is different from is established and the knowledge domains of publications could have little in common to their classification which could represent a misfit taxonomy.

C. Selecting the curse of actions to solve or mitigate the problem

Narrowing the scope of action was fundamental to understand a representative part of the problem. Narrowing down the problem to the application case in one research center and consequent evaluation of data (available and extractable) and processes, at the end there were 2 line of actions identified:

-Automatic classification of research papers through ML

-A change in the classification taxonomy

D. Evaluating the consequences of the actions

To achieve the first goal the extracted data of all properly classified research papers from the use case in scope was subjected to the data preparation for ML model development based on the available fields (Table 1):

The title alone turned out to be misleading as can be demonstrated on the next chapters and the extraction of the abstract was initiated.

A second possible path that would add value would be to compare the classification in place for the research center in scope, the Frascati Manual, which is the one recommended by the FCT-*Fundação para a Ciência e Tecnologia* (Foundation for Science and Technology) and supported by OCDE - Organization for Economic Cooperation and Development, with the classification schemes used by major repositories or indexers for Science Research with the goal to normalize taxonomies. But this was not in the scope for this project.

E. Identifying learnings and findings achieved and closing the loop with proposals for future improvements or new course of actions

This is the final step for each iteration and chapter 4 contains discussion, limitations, learnings and future work suggestions.

Although Action Research methodology aims for iterative improvement cycles, this is to be considered as a first iteration, with initial observations and first prototype for a final solution based on considerations stated on 4.3-Future work.

1.5 Structure of this report

This document is structured in the following way:

- **Chapter 1** is where it is explained the reasons and motivations behind this work.
- **Chapter** Error! Reference source not found. describes the state of art related to the subjects of interest, in this case how the classification systems of text documents evolved and are applied in our days and how ML, or AI in general, are contributing to improve the classification of text documents.
- **Chapter 3** is dedicated to describing the application of the selected text classification process in a narrowed down scope. In this case the classification of Scientific Research documents for which the Algoritmi, a research unit of the School of Engineering of the University of Minho, Portugal.
- **Chapter 4** contains conclusion from the project, work limitations found during this work and what is expected to improve in future works

2. INTRODUCTION TO CLASSIFICATION SYSTEMS

In order to provide a proper solution to the problem in hands there was the need to understand the concepts involved. Independently of the classification system the variety of machine learning classification techniques is vast and is the core of this work. The two subchapters are therefore:

- classification systems,
- machine learning classification

2.1 Classification systems

As scholarly research becomes increasingly interdisciplinary, a key purpose for a classification system is to facilitate interdisciplinary research and information sharing (Jones, 2005).

Auguste Comte proposed a scheme of classification of the science arguing that while 'the division of intellectual labor' was necessary and the disciplines would have to be separately cultivated, he also stressed that the sciences all belonged to a 'greater whole' and that any division was 'at bottom artificial' (Comte, 1988).

A classification system should contain, amongst other features, (Rich, 1992):

- Breadth - Defined as either a typology or a taxonomy that will be the basis for classes where the subjects would be classified or grouped.
- Meaning - Supporting the rational use of the selected classification method and classes should be a philosophical foundation.
- Depth – as close as possible to support the diversity of real-life phenomena
- Recognizability – it must mirror the real world

For better understanding a classification system we need to understand what a taxonomy, and ontology and a thesaurus (Brewster & Wilks, 2004), and finally the specifics of classification applied to science.

2.1.1. Controlled Vocabulary

A controlled vocabulary is a closed collection of terms that have been explicitly grouped and can be used for classification. It is controlled because the list is limited, and there is control over who can add terms to the list, when and how.

2.1.2. Taxonomy

Taxonomy, as the science of defining groups of biological organisms based on shared characteristics and naming those groups, groups organisms together into taxa (singular: taxon) and these groups are given a taxonomic rank; groups of a given rank can be aggregated to form a super group of higher rank, thus creating a taxonomic hierarchy (Frodeman & Klein, 2012). A taxonomy normally has some hierarchical relationships embedded in its classifications.

2.1.3. Thesaurus

Thesaurus can be understood as an extension to taxonomy: it takes taxonomy as described above, allowing subjects to be arranged in a hierarchy and in addition, it adds the ability to allow other statements to be made about the subjects.

Both the taxonomy and the thesaurus can fall into the Knowledge Organization Schemes (KOS) class because they provide the set of structured elements to be used for describing and indexing objects, browsing collections, etc.

2.1.4. Ontology

Ontology, originally from philosophical domain, has been given a new definition with the development of Artificial Intelligence as a *formal, explicit specification of a shared conceptualization* (Studer et al., 1998). They represent the set objects, their properties and relationships, we can use in a specified domain of knowledge. By defining the terms and their relationships, ontology encodes a knowledge domain in such a way that it can be understood by a machine. The W3C standard for defining ontologies is OWL, a key component of semantic web technologies (*OWL - Semantic Web Standards*, 2012). Ontologies are also often interpreted as the classification mechanism itself.

On Figure 4 these concepts are represented in order of complexity.

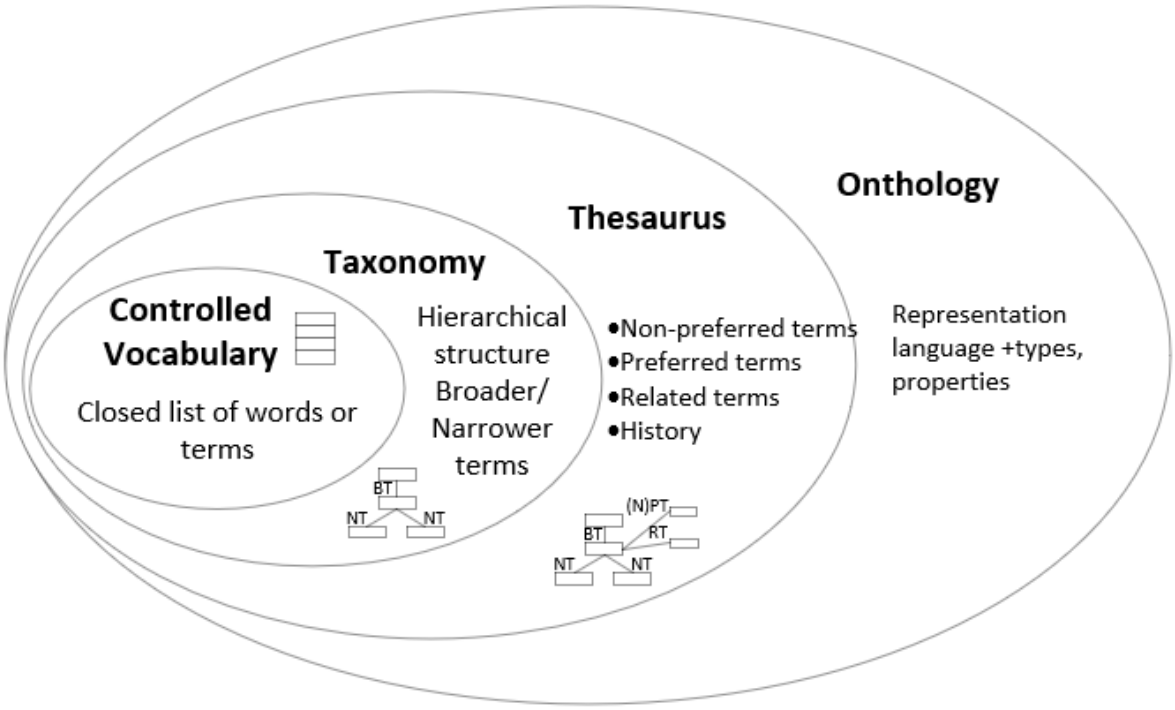


Figure 4 – Classification Categories

Adapted from (Kopácsi et al., 2017)

2.2 Machine Learning – KDD and Classification

Manual analysis and interpretation have been the traditional method of turning data into knowledge. For example, in the health care industry is common for the specialists to analyze trends on data shown on quarterly magazines. A short report based on this trend analysis is then used as basis for decision making and analysis. This type of data analysis is based on the familiarity with the data, and can take time, therefore can be expensive. After some time, the data analyst can or will introduce personal and highly subjective bias on the results.

This is where Knowledge Discovery in Databases (KDD) or in Texts (KDT) came in place and started to make sense (Fayyad et al., 1996).

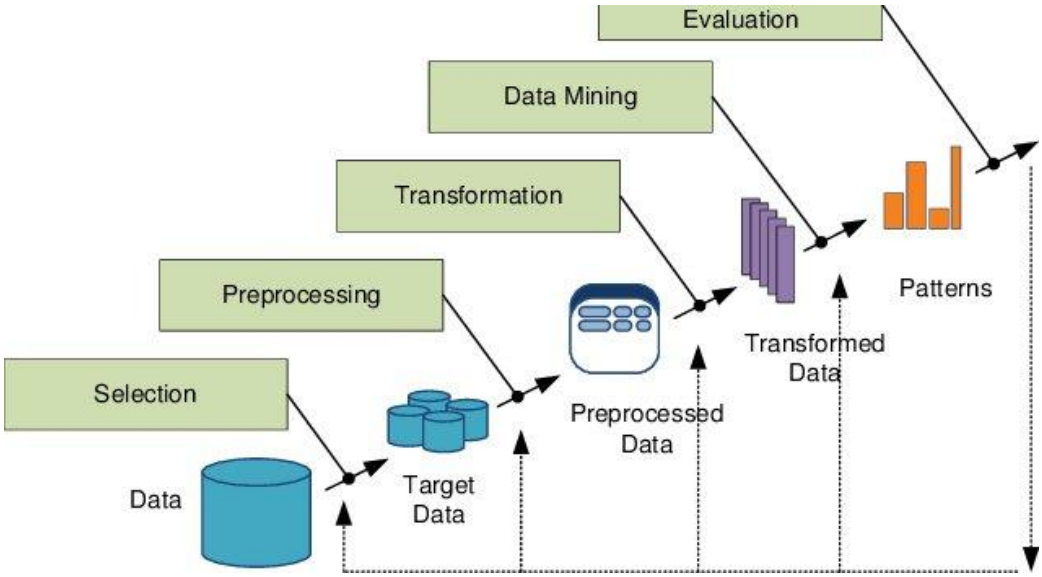


Figure 5 – An overview of the KDD process

Source: Costagliola et al., 2009, adapted from Fayyad et al., 1996.

The same authors have shown also de role of Artificial Intelligence (AI) in KDT with Natural Language Processing (NLP) as an example of application contributing significantly for automated annotation and indexing for classification of text corpora but it needed external data support in the form of ontologies, thesaurus, etc. which (Atkinson-abutridy et al., 2003) considered a restrictions to the application of new patterns yet undiscovered, frequently occurring in innovative scientific publications.

Machine learning (ML) aims to provide automated extraction of insights from data.

Standard learning systems (like neural networks or decision trees) operate on input data after they have been transformed into feature vectors. The data vectors or points can be separated by a surface, clustered, interpolated or otherwise analyzed. The resulting hypothesis will then be applied to test points in the same vector space, in order to make predictions or classifications (Lodhi et al., 2002). This approach loses all the word order information only retaining the frequency of the terms in the document by removing non-informative words (stop words) and by the replacing of words by their stems, or stemming (Joachims, 1998).

2.2.1. Processing text with NLP techniques

Natural Language Processing (NLP) is a range of computational techniques for automated analysis and representation of human language enabling computers to perform a wide range of natural language

related tasks at all levels. Research on this field has evolved in such a way that millions of webpages can be processed in less than a second (Cambria & White, 2014).

Processing natural language in its many aspects is illustrated in Figure 6. On the left side are represented the requirements to develop an NLP system. The first big challenge is to get enough data as word dictionary to provide the system with enough linguistic and semantic knowledge of each possible class in the taxonomy to use.

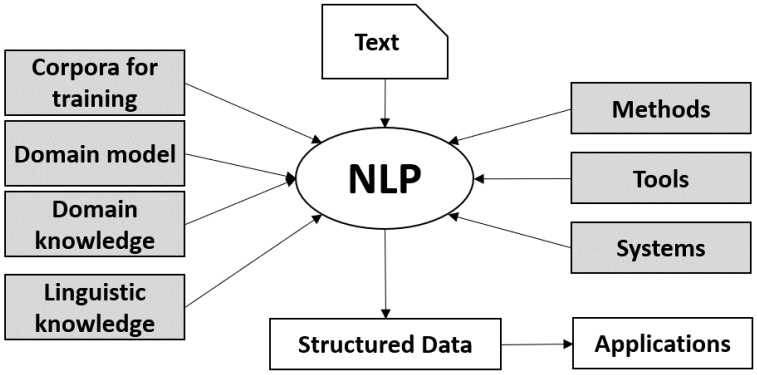


Figure 6 – Aspects of NLP

Adapted from (Friedman et al., 2013).

The right side of Figure 6 represents the operationalization of NLP with the methods, systems and tools. The output with structured data can then feed a ML (or other) system.

We can split natural language understanding at word level and concept level approaches as Syntax-centered NLP and Semantics-based NLP respectively.

Syntax-centered NLP techniques

Syntax-centered NLP is a popular way to manage tasks such as information retrieval and extraction, auto-categorization, topic modeling, etc. as shown on Figure 7 (Cambria & White, 2014).

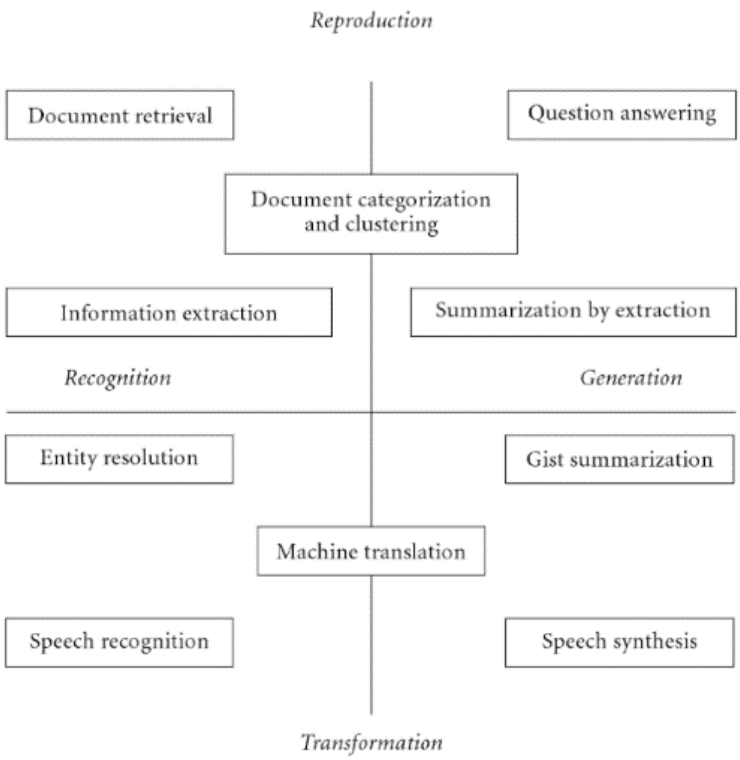


Figure 7 – Natural Language applications

From: Cambria and White - 2014

One of the most popular techniques under this category, probably due to its accessibility despite being a naïve approach, is Keyword Spotting.

- Keyword Spotting

Text classification based on the presence of unambiguous words is a technique known as Keyword Spotting but has a major weakness of relying its accuracy on the surface of the text with the ambiguity of terms when these are analyzed independently of its context. Word-sense disambiguation has been done with high accuracy when all information is derived automatically from corpora resulting in a method for formulating probabilistic models that use multiple contextual features for word-sense disambiguation without requiring untested assumptions regarding the form of the model (Bruce & Wiebe, 1994).

A way to overcome this weakness in Keyword Spotting would be the use of Part-Of-Speech tagging.

- Part-of-Speech

Part-of-Speech (POS), a technique also referred to as Part-of-Speech (or PoS) tagging is a linguistic technique that resources to technology to enrich data with information from the extraction and analysis of words or constructs mainly prepositional and based on syntactic parsing (Brill, 1995).

Semantics based NLP

Not only can many different words be used to describe the same concept, but each individual word can have a variety of meanings (Grefenstette, 1994). For example, a "bear" or a "bull" are terms used to classify the behavior of a stock market yet has no relation to animal life but to the way the market mimics these animals' behaviors. Context is of great importance, therefore.

Several other techniques for extracting meaning from texts are:

- Fuzzy logic NLP (Carvalho et al., 2012),
    - Fuzzy Sets in NLP have seen a decline on the first decade of the twenty first century and alternative approaches such as genetic algorithms and neural networks can perform just as well for non-binary or analog inputs such as linguistic ones.

- Sentiment Analysis (Subasic & Huettner, 2000)
    - Analyzing affect in a text, introducing a human dimension into understanding and representation as affect analysis of textual content.

- Linguistic summarization (Kacprzyk & Zadrozny, 2010)
    - Data summarization is one of the basic capabilities that is needed by any "intelligent" system meant to operate in real life with an abundance of data that is beyond human cognition and comprehension. But the result output of a linguistic summary is probably just too simple and too homogenous due to the use of simple and extended protoforms.

- Text Categorization (Araujo, 2003)
    - Process of categorization of text into groups using Natural Language Processing (NLP), to automatically analyze text and then assign a set of pre-defined tags based on its content.

- Knowledge Discovery from Text (Atkinson-abutridy et al., 2003)
    - Involves discovering interesting unseen patterns in text databases for the purposes of extracting interesting and novel knowledge.

2.2.2. Automatic Classification Algorithms.

Active learning using Generative and Discriminative models could improve the finding of new classes particularly those with weak representation in a dataset, the rare classes. Commonly the approach to discover these rare classes without recurring to supervised learning is the outlier detection method (Hospedales et al., 2013).

Neural networks are traditionally used as discriminative models but could also be improved through the use of a mixed model with informative approach for some features and discriminative on others (Rubinstein & Hastie, 1997).

- Statistical NLP

Statistical NLP uses statistical learning methods like Hidden Markov Models and Logistic Regression to enable syntactic and semantic analysis of texts (Manning et al., 1999). In statistical natural language processing, one common way of modeling the contributions of different topics to a document (features) is to treat each topic as a probability distribution over words, viewing a document as a probabilistic mixture of these topics.

- CNN - Convolutional Neural Networks

Frequently used in machine vision, when applied to language it allows for the evolution from mere NLP to what is usually refer to as Natural Language Understanding (NLU) and requires resources for representing semantic relations and some mechanism to interpret them.

Text classification done using latent semantic analysis encoding and convolutional neural network as a classifier obtained accuracy results ranging from 87% up to 100% (Patil et al., 2017). In convolutional

neural network, various layers are present. This architecture makes it very good classifier for text classification purpose. It works well for binary as well as multi-class classification.

Other types of neural network are:

- RNN – Recurrent Neural Networks
- Recursive Neural Networks
- Deep Reinforced Models and Deep Unsupervised Learning
- Memory Augmented Networks

2.2.3. Machine Learning techniques and algorithms

It was important to identify one or a set of Machine Learning (ML) techniques. Since regression techniques are used when the response variable is continuous whereas the classification techniques are used when we are dealing with categorical data, which is the case, then the choice was to focus on classification algorithms.

2.2.4. Machine Learning Models

Machine learning (ML) gets results by means of a predictive model. A predictive model is a function or combination of functions that maps features (vectors) to an output. In a supervised setting, a previously gathered dataset with corresponding output class labels (e.g., a diagnosis) serves to train a predictive model that can generate labels on future inputs preferably with the same probabilistic distribution. We can find models trained for fraud or spam detection, markets conditions, diagnostics, consumers' preferences, etc. These are just some techniques used to build ML models:

- Naïve Bayes Classifier greatly simplify learning by assuming that features are independent given class. Although independence is generally a poor assumption, in practice naive Bayes often competes well with more sophisticated classifiers. These are just some variants for NB classifier
    - Multinomial
    - Bernoulli
    - Complement
- Support Vector Machine are supervised learning models popular in ML for both regression and classification analysis. It can map new data to classes clearly separated by vectors, the more space between clusters the higher is the accuracy or it can be used to find patterns in unlabeled

data through an unsupervised learning to find data clustering and then map new data to these classes.

- Nearest centroid is a variation of the nearest neighbor but bases the result on the nearest centroid.
- SGD - Stochastic gradient descent is an iterative method or algorithm that can be used in other ML techniques to optimize an objective function
- Perceptron (SGD variant) is a simple algorithm intended to perform binary classification. It predicts whether an input belongs to a certain category of interest or not: fraud or not fraud, for example. It is a linear classifier, an algorithm that classifies input by separating two categories with a straight line.
- Linear SVC (Support Vector Classifier) models are a subset of SVMs and are built by creating a multidimensional feature space, where each dimension represents a "feature" of a particular object. In the context of document classification, each "feature" is the prevalence or importance of a particular word.
- K Nearest Neighbor is a supervised learning algorithm used for both regression and classification. To classify an object, it works based on closest training examples in the feature space. Very similar on how humans classify a car based on nearest similarities of features for that brand.
- Ridge Classifier is based on a regressor transformed into a classifier through threshold methods. Through the use of a “ridge estimator” it produces new estimators that are shrunk closer to the “true” population parameters.
- Random Forest consists of a combination of tree classifiers in which each classifier is generated using a random vector sampled independently from the input vector, and each tree casts a unit vote for the most popular class to classify an input vector
- Passive Aggressive classifier technique adjusts its weight vector for each misclassified training sample it receives, trying to correct the vector that separates the hyperplane.
- Bagging Models resort to techniques to reduce the model variance and therefore make the model more noise independent, by using base classifiers on random subsets of the original dataset and then aggregating their individual predictions for a final prediction result.
- Boosting Models, very similar to Bagging which is also an ensemble technique, is an iterative technique that also resorts to random subsets of the original dataset, and then adjusts the weight of an observation based on the last classification.

- Shallow Neural Networks are considered a mid-way towards Deep NN but where only one layer is hidden whereas in Deep NN many or all layers are hidden
- Deep Neural Networks, are an evolution of NN that contains multiple layers in order to learn more about relationships within the data and how the features interact with each other on a non-linear level. Both supervised and unsupervised learning can be used, and changes the weight between neurons on each iteration of the dataset using a Gradient Descent technique. These are a few of the Deep NN techniques:
    - Convolutional Neural Network (CNN)
    - Long/Short-Term Memory (LSTM)
    - Gated Recurrent Unit (GRU)
    - Bidirectional RNN
    - Recurrent Convolutional Neural Network (RCNN)
    - Other Variants of Deep Neural Networks

2.3 Text Classification Process

To reduce the text dimension two possibilities exist:

1. either selecting a subset of the original features, or

2. transforming the features into new ones, that is, computing new features as some functions of the old ones.

Ikonomakis et al., (2005) as shows the following graphical representation of the process (Figure 8).

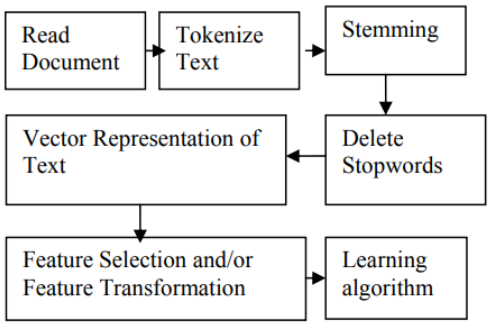


Figure 8 - Text Classification process

From: Ikonomakis et al., 2005

Ikonomakis et al., (2005) also concludes that text classification problem is an Artificial Intelligence research topic, especially given the vast number of documents available in the form of web pages and other electronic texts like emails, discussion forum postings and other electronic documents.

Toman et al. (2006) suggests using Lemmatization as a morphological analyzer to transform words into their basic forms. These authors performed some experiments to examine the influence of word normalization and stop-words removal on the text classification and they compared their results on a Naïve Bayes classifier with other researches employing the same classifier for text classification on different lemmatized, stemmed or non-preprocessed datasets. While concluding that individually each word normalization step was not statistically significant (stemming, stop-words, lemmatizing), all together they contribute slightly to improve classification accuracy while reducing the text complexity and consequently compressing the classification time (Toman et al., 2006).

Their evaluation shows that stemming is good for English but lemmatizing should improve accuracy on more morphologically rich languages.

Chouhan & Prabhune, (2019), in the Architecture of Feature Identification Framework, proposes the following techniques for the NLP pre-processing step (as represented in the model in Figure 9):

- Tokenizer
- Stop-words removal
- Synonymization
- PoST or Parts-of-Speech-Tagging
- Spelling Corrector

Akhmetov et al., (2020) also refer to the importance of lemmatizing on their work to build a language independent lemmatizing but there are already good English language lemmatizers which is the scope of this project. Nevertheless, it worth mentioning this approach for future development to other languages.

Many works read while analyzing the state of art, like (Singh et al., 2019), (Kou et al., 2020) or (Diab, 2019), just to name a few, refer to the use of python and the tools available in this programming language to support text processing, features identification and classification algorithms. (Verma et al., 2020), resort to the Natural Language Tool Kit (NLTK) in python for tasks including: removing stop words,

punctuations, special characters, tokenization, stemming, tagging, language detection and identification of semantic relationships.

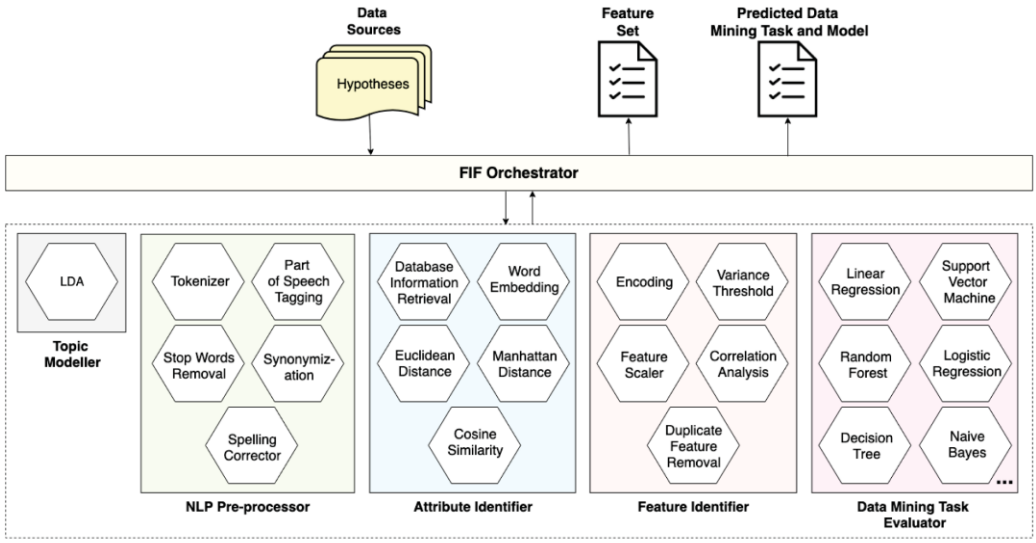


Figure 9 - Architecture of Feature Identification Framework (FIF)

From:(Chouhan & Prabhune, 2019)

2.4 Summary

NLP has great potential to be used as a pre-processing step on a classification ML or as a classifier itself. Recent investigations show that the use of NLP as a pre-processor for neural networks or in a more advanced fashion Convolutional Neural Networks, with multiple levels and stages of *perceptrons*, and supported by a Thesaurus and a good Ontology can achieve good classification results. There would be still some limitation for the discovery of new classes, though (Lopez & Kalita, 2017).

All the above needs to be supported by a Taxonomy capable of dealing with the complexity and changes on classes of text. This is especially important when dealing with the interdisciplinary aspect of science and the dynamics it creates on semantics due to eventual cross-ontology (Manda et al., 2012).

Reviewing the NLP pre-processing steps, there was the need to confirm that these tasks are suited for the solution to the problem and potentially add some more insight to this technique. The absence of Ontological Web Semantics Metadata and the size of the available dataset also weighted on the decision to start with a simple approach.

3. APPLICATION CASE

This work scope was narrowed down to an academic research center as being representative of the generality of the academics in general. Centro ALGORITMI presented a good opportunity to serve as this representation. It is a research unit of the School of Engineering – University of Minho, that develops R&D activity in Information and Communications Technology and Electronics (ICT&E) and it is divided in four major fields (*Centro ALGORITMI - Universidade Do Minho*, 2018):

- Electrical Engineering, Electronics and Nanotechnology.
- Operations Research, Statistics and Numerical Methods.
- Information Systems, Software and Multimedia.
- Communications, Computer Networks and Pervasive Computing.

It is structured in 6 Research Lines or domains, each integrating the following Research Groups, or sub-domains:

- SEOR - Systems Engineering and Operational Research
    - (no groups)
- IST - Information Systems and Technologies
    - ISTTOS - Information Systems and Technologies for Transformation of Organizations and Society
    - SEMAG - Software-based Information Systems Engineering and Management Group
    - IDS - Intelligent Data Systems
- IEM - Industrial Engineering and Management
    - EHF - Ergonomics & Human Factors Group
    - SLOTS - Supply Chain, Logistics and Transportation Systems
    - EMES - Economics and Management of Engineering Systems
- CCPM - Computer Communications and Pervasive Media
    - CCN - Computer Communications and Networks
    - UBICOMP - Mobile and Ubiquitous Systems Group
- CST - Computer Science and Technology
    - KEG - Knowledge Engineering Group

    - ISLab - Synthetic Intelligence group
- IE - Industrial Electronics
    - GEPE - Energy and Power Electronics
    - ESRG - Embedded Systems Research Group
    - CAR - Control, Automation and Robotics

The scientific paper classification contains an additional limiting factor that we have a popular taxonomy and a scientific taxonomy (Friedman et al., 2013).

These research groups are nor hermetic and we can see co-authors from every group on any other group, and if this research center is normal, we would see this number increase over time as the studies analyzed before were able to show.

We can start to ask if the taxonomy in place can deal with these multidisciplinary publications.

The Portuguese Science and Technology Foundation (*Fundação para a Ciência e Tecnologia,* FCT) uses its very own taxonomy scheme for organization of research projects and products. There is another one, the DeGóis, but mostly used for curriculum organization.

The FCT classification system (*FCT - Fundação Para a Ciência e a Tecnologia*, 2019) is organized by scientific domains and scientific areas. Four domains are identified: Life and Health Sciences; Exact Sciences and engineering; Natural and Environmental Sciences; and Social Sciences and the Humanities. Each of these domains is composed of scientific areas and subareas.

From the compared taxonomy schemes, the one used by the Algoritmi, due to the reduced depth, tends to generalize more and therefore to be somehow limited or reducer. This may cause an increase of overlapping or high aggregation of subjects.

- FCT adopted Frascati lacks in depth.
- Fails to represent the real world for a “popular taxonomy”.

A Research Paper is an analysis on a perspective over a subject that provides new information to science in general or in a specific field of knowledge, backed up by others work and ideas or that presents irrefutable proofs over new approaches. These publications can be the result of a single individual work or a team of researchers.

Studies on the behavior of research products shows an increase in the number of authors per papers as well as an increasing number of citations per subject or area of knowledge (Porter & Rafols, 2009), as the chart shows on Figure 10 . This can be the result either of an increase in the communications across scientific research communities through the digitalization and appearance on the 80's of the modern internet, or the rising of new fields of research through cross knowledge domains collaborations.

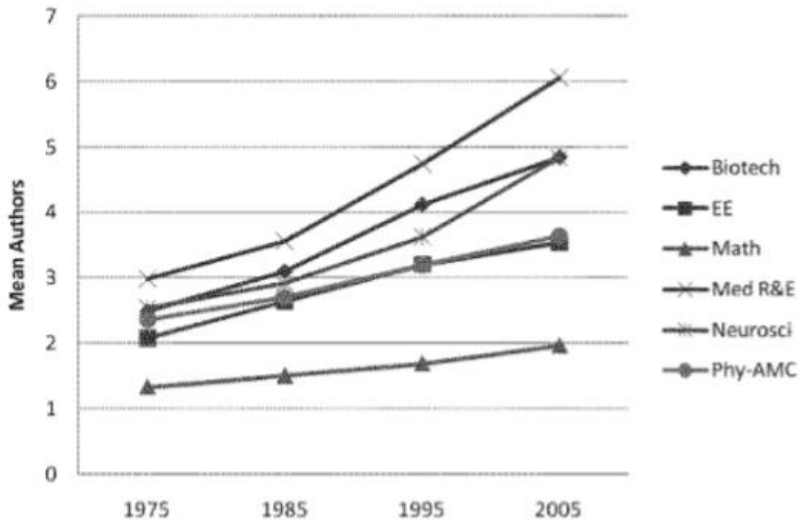


Figure 10 – Number of authors per paper over time

From: (Porter & Rafols, 2009)

Algoritmi publications from recent years do not follow this pattern and since 2008 that the average of authors is around 2.5 as represented on Figure 11.

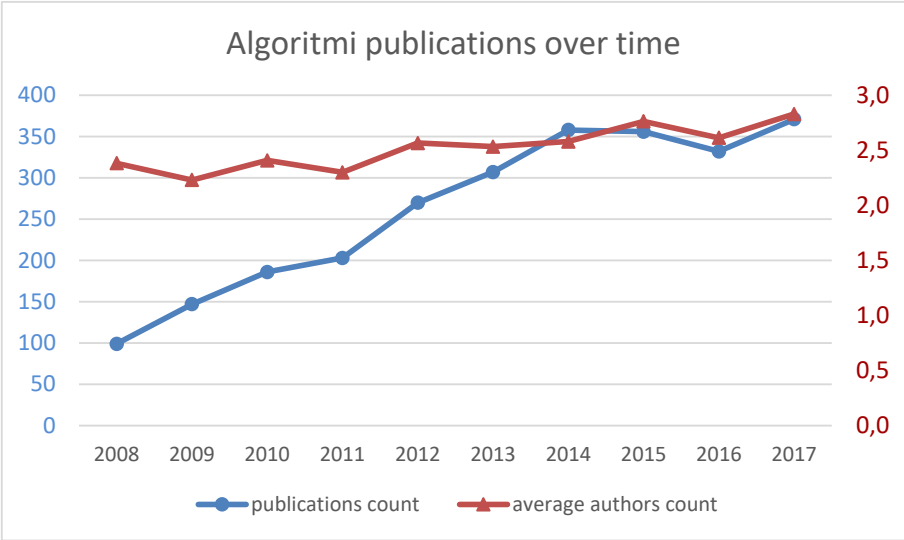


Figure 11 – Algoritmi publications and authors per paper

Built from dataset

The SKO (Scientific Knowledge Object) in Figure 12 is displayed as publication from IE group because was done in a collaboration with 3 members of IE group. From the title analysis we could relate this publication to EHF Ergonomics & Human Factors Group research group, but would take a text, or at least an analysis to its abstract to determine the correct knowledge domain of his work otherwise it could easily be misinterpreted as a health care article.

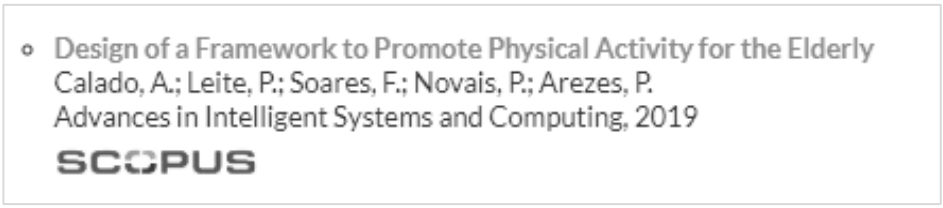


Figure 12 – An Algoritmi IE publication

*(*Algoritmi IE Publications List*, 2018)*

Retrieved from http://algoritmi.uminho.pt/research-teams/ie/. and reprinted with permission on Annex II.

This type of scenarios provides clues on how co-authoring plays a role in developing science as Porter and Rafols show on Figure 13.

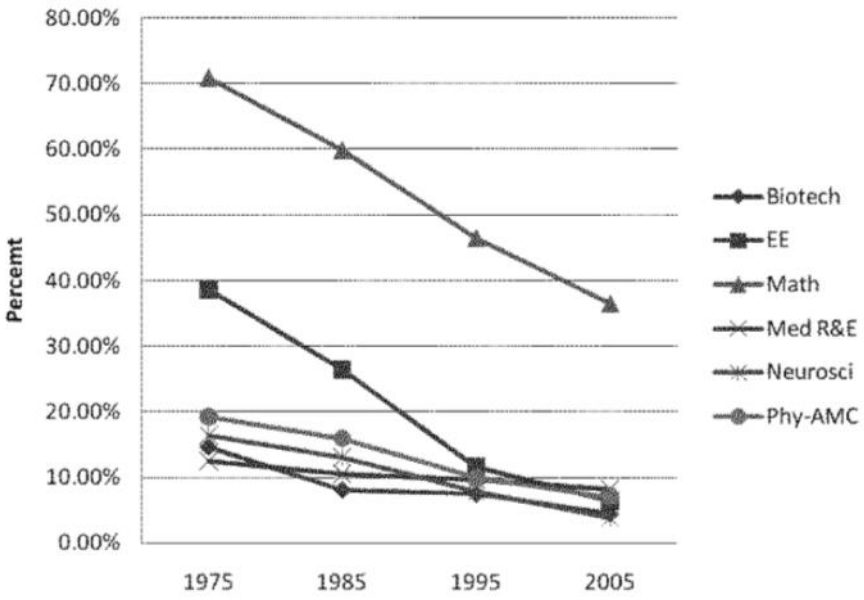


Figure 13 – Single-authored papers over time

From: (Porter & Rafols, 2009)

Single-Authored papers at Algoritmi research center follows the same down trend yet slightly less steeped as shown on Figure 14.

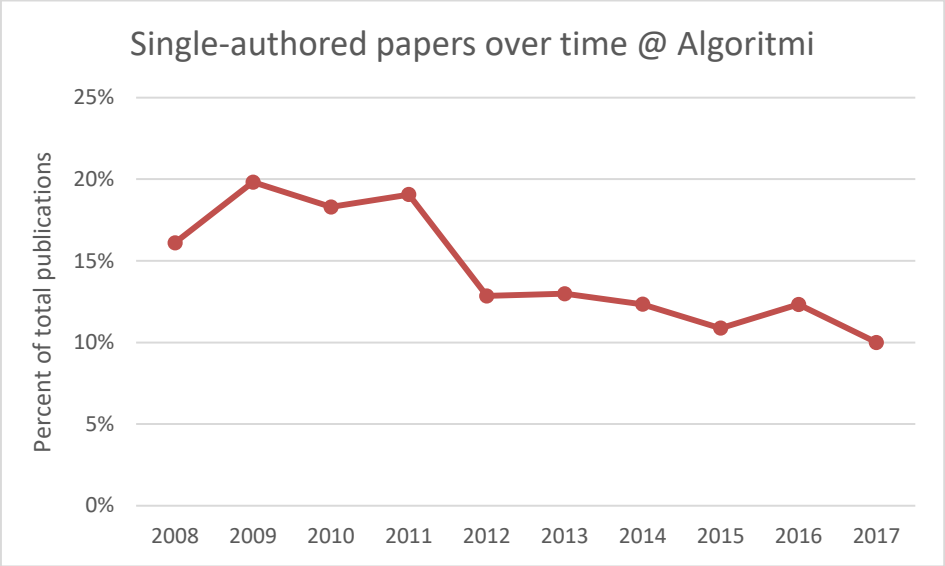


Figure 14 – Algoritmi Single-Authored publications over time

We can establish that we have:

1. Cross-domains research sharing discipline-based knowledge investigating a phenomenon which may lead to new fields of research
2. A classification method that requires an increasing effort to keep consistency and the combination of the above factors that makes the classification system in place uncapable of handling with these changes.

3.1 Research Areas evolution characterization

Since we are aiming to classify SKO's in the form of texts it was important to understand the state of the art in the way science is classified. This subchapter explains the particularities in classifying SKO's.

At the time of this work, 4 main repositories / indexers were identified for bibliometric data for researchers, publications and institutions. They are all originating in private companies, they all differ in the way they classify publications, but all classify them based on their discipline (Yu et al., 2016):

- WoK - Web of Knowledge (Thompson Reuters)
    - WoK includes Web of Science (WoS) developed by Thomson Scientific, a part of the Thomson Corporation and has dominated the field of academic reference, mainly through the annual release of the journal impact factor, a tool for evaluating the importance and influence of specific publications. The impact factor has been highly criticized but remains the most widely used of the indexes available.

- SCUPUS (Elsevier)
    - Scopus was developed by Elsevier, combining some of the characteristics from Web of Science to focus on research and academic needs (citation analysis for example). It offers several search filters like author, source, date of publishing, document type, subject areas, and other more operators and codes like ISSN number or publisher. The citation analysis that Scopus performs is presented as a table with numbers of cited articles for individual years, as well as the total number of cited references for all years. The articles cited can be accessed by simply clicking on the number of citations. In addition, Scopus has search tips written in 10 languages.

- GS - Google Scholar (Google inc.)
    - Google Scholar presumably lists all publications resulting from the electronic search or indexation from search engines. Being essentially a web search engine, its aim is to reach the widest audience available. Google Scholar presents all the benefits and drawbacks of the WWW and results with Google Scholar are displayed in relation to times of visits from users, not in relation to another index of quality of the publication.

- RG – Research Gate
    - a European commercial social networking site for scientists and researchers. It combines bibliometrics and altmetrics to create a more comprehensive performance measure for researchers and institutions. It also provides the ResearchGate score: a metric that measure scientific reputation.

3.2 Classification schemes, taxonomies

There are several referential/schemes with some predominant preference by the academics for taxonomies that differ from those used by referential indexing platforms.

Some of the regional preferences for institutional or government managed schemas are:

- ANVUR- Italy
- FOR lvl1 & lvl2 - Australia
- SCADC - China
- FAPESP - Brazil
- RAE2008/REF2014 - UK
- KAKEN – Japan
- FRASCATI MANUAL - OECD

In the Portuguese context, the OECD framework is used, that is, the Frascati Manual. Thus, a brief description of it is given below.

The OECD's Frascati Manual has become the ruling document for the international standards and definitions of scientific and technological activity. It is through this manual that policy makers, policy analysts and economists in the OECD countries can discuss the relative performance of countries in terms of R&D expenditures and personnel (Godin, 2009).

On the release notes it is clearly stated that an effort to keep a 2-digit categories low and avoiding trend breaks were important factors to keep existing classification as close as its original version as possible, but at least one of the main reasons was to keep administrative burden to a minimum without consideration for scientific research implications (OECD, 2015). It has been criticized from within the science domain too regarding its application as assuming a linear model of R&D and innovation, which has limited application in resource-based economies (Gulbrandsen & Kyvik, 2010).

Frascati Manual does not consider novel domains resulting from the overlap or combination on the knowledge of collaboration researchers and the phenomena they are studying when applied to other contexts and realities. A good example would be the application of 3D printing materials in the medical areas or the implications in society of self-awareness in the computing domain.

3.3 Toolset, dataset and method

As was observed during state of art analysis phase, python is becoming very popular in machine learning applications because it contains some very popular scientific computing tools including deep learning virtual environments which makes it ideal for the testing scenario.

As a developing ecosystem, the open source Anaconda was used as it provided an integrated, end-to-end data science tools to manage libraries, dependencies, and environments, develop and train machine learning and deep learning models, analyze data and includes results visualization tools. Through Anaconda, the Jupyter Notebook, served as virtual Python environment and Python 3 kernel (version 3.7.4) was used for this task.

3.3.1. The dataset

The dataset available does not contain the authors affiliation other than that we know of, Algoritmi Research Center of University of Minho. We could also build a matrix of author and co-author relations between them and previous work or association, but this would over-fit the model. The used dataset contains 10 fields as shown on Table 1. The goal is to classify the "knowledge domain" and the training set contains manually classified samples based on Portuguese FCT taxonomy model.

Table 1 - Centro Algoritmi extracted data fields

#	Field	Sample 1
1	Author	Alexandre Manuel Tavares Bragança
2	Publication	Systematic use of software development patterns through a multilevel and multistage classification
3	Type of publication	Book Chapter
4	Knowledge Domain	Ciência da Computação
5	Grande area	Ciências Naturais
6	Date of publication	2010
7	Web link	https://www.scopus.com/record/display.uri?eid=...
8	Co-authors	S. Azevedo (Uminho); Ricardo J. Machado, 133; H. Ribeiro (Primavera Business Software Solutions)
9	Abstract language	English
10	Abstract text	Software patterns are reusable solutions to problems that occur often throughout the software development process. This chapter formally states which sort of ...

The used dataset was obtained through human classification achieved by reading through the science articles and classifying according to FCT taxonomy.

Characterization of the dataset:

- Size: 2665 publications
- Authors: 153 authors
- Types of publications: 16
- Time frame: 2008-2017
- Single authored publications: 276
- Co-authored publications: 2389
- 14 Knowledge Domains:
    1. Sistemas de Comunicação
    2. Ciência da Computação
    3. Sistemas de informação
    4. Educação
    5. Gestão
    6. Engenharia Eletrónica
    7. Organização e Métodos
    8. Sem informação
    9. Engenharia Mecânica
    10. Outras ciências da Engenharia
    11. Engenharia Civil
    12. Análise de Sistemas
    13. Antropologia
    14. Sociologia

The dataset contained a few pitfalls:

- The dataset did not contain any part of the text or the abstract.
- The dataset did contain hyperlinks to the source but not properly formatted, it was formatted for a specific credentials or the source was no longer valid for the majority of the publications.

The goal is to classify the text by its content and not by who did it, which is one of the risks of biasing in the current method for classification (Figure 15).

Access to a dataset with the paper full text itself would be a possibility but the abstract should be representative enough for the full text.

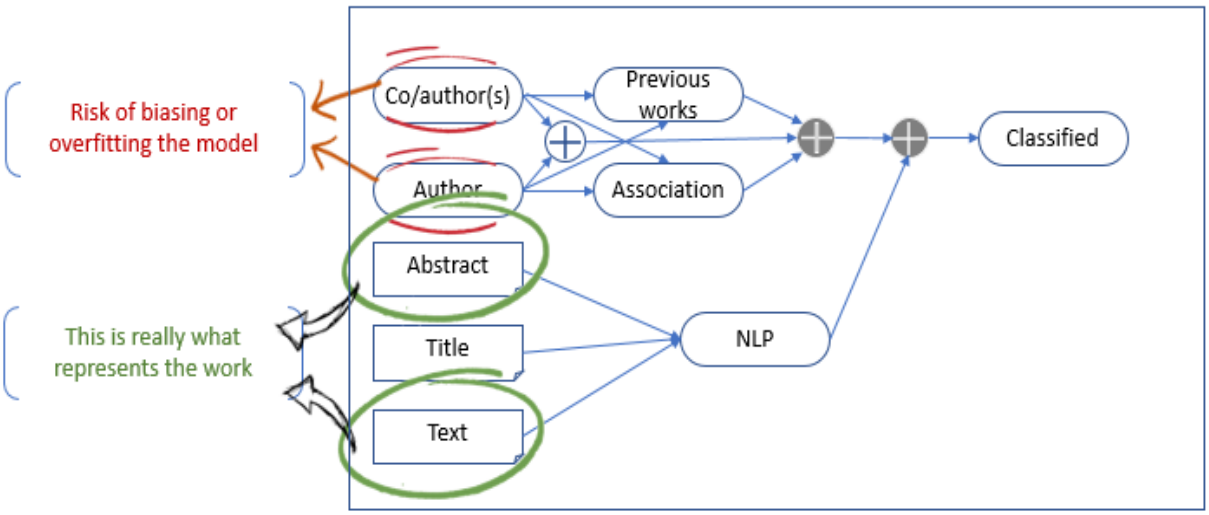


Figure 15 – Model Overfitting features

3.3.2. Natural Language Processing of abstract field

Because it provides easy-to-use APIs for a wide variety of text preprocessing methods, Python's Natural Language Toolkit (NLTK) was installed, from http://pypi.python.org/pypi/nltk (Figure 16) providing common NLP tasks. It is one of the most used libraries for natural language processing and computational linguistics.

It consists of a suite of program modules, data sets and tutorials supporting research and teaching in computational linguistics and natural language processing. NLTK contains several corpora and includes a small selection of texts from the Project Gutenberg, which contains some 25,000 free electronic books, Shakespeare's Macbeth, Hamlet, or Julius Cesar or the King James version of the bible, amongst many others.

Using the NLTK it is possible to run the abstract text through the steps suggested by Ikonomakis on his text classification process. Later the decision was made to include Lemmatizing step to improve accuracy and reduce train+test time.

```
!pip install nltk
Requirement already satisfied: nltk in c:\users\a6282\anaconda3\lib\site-packages (3.4.5)
Requirement already satisfied: six in c:\users\a6282\anaconda3\lib\site-packages (from nltk) (1.12.0)
```

Figure 16 – Natural Language Tool Kit install

Importing NLTK library and getting the NLTK Downloader Application (Figure 17) provides quick access to several natural language tools (Figure 18).

```
import nltk
```

```
nltk.download()
```

Figure 17 – NLTK library download

From the toolkit the Stopwords Corpus package (Figure 18) that is going to be used to remove redundant repeated words needs to be downloaded.

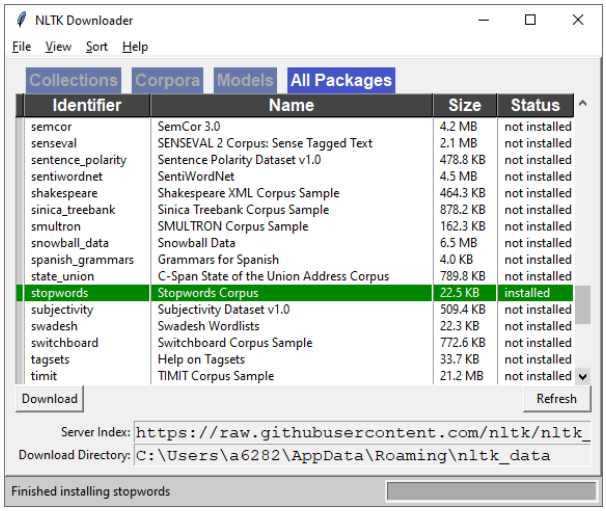


Figure 18 – NTLK Stopwords package installation

One possible approach for using ML to classify documents could be the author field. In a scarce dataset the model is highly biased by the authors affiliation to a particular school or domain and therefore for this exercise, the author's names were disregarded as classification features.

It is possible that, with a better dataset, the author and its affiliation could be interesting features to improve models' accuracy.

After importing training dataset, it was evident the need to clean the text (Figure 19).

```
In [3]:
1 ds=open("TestDataset.tsv").read()
2 ds[0:1000]
3

Out[3]: 'Sistemas de Comunicacao\tA great source of CO2 emission for the terrestrial atmosphere is the fuel consumption by road vehi
cles. This phenomenon owes very much to the fact of the car being the preferred mode of transportation for short and medium
distances, for the majority of the world population, given its convenience and flexibility. With the development of mobile t
echnology and its spread in the market, many applications have been developed that, from mobility data, give a great user su
pport in terms of guidance and management of their travels. Being GPS the main source of location data used in smartphones,
solutions that suggest to the driver paths or behaviours that reduce fuel consumption can be developed based on a model that
estimates fuel consumption instantaneously across his data mobility. Through a data gathering with the use of smartphones wi
th embedded GPS in communication with an external device (OBD) that provides information on fuel consumption, it was develop
ed a regr'
```

Figure 19 – Abstract text from dataset

Pandas, a data structures and data analysis tool for the Python programming language, to clean abstract text, provides high-performance, easy-to-use data structures and data analysis in Python programming language allowing fast analysis and data cleaning and preparation.

An alternative to Pandas would be Numpy or Scipy, but Pandas works very well with labeled data, hence the root of Pandas name: Panel Data. Numpy could be more helpful for numerical data (Num).

Using Pandas (Figure 20) to import the abstract text from the dataset, and the domain since we'll be using this as the target for classification:

```
In [74]:
1 import pandas as panda

In [78]:
1 data = panda.read_csv('TrainDataset.tsv', sep='\t', names=['domain','abstract'], header=None)
2
```

Figure 20 – Using Pandas for text analysis

Vital to disambiguate sentence meanings, the punctuation would also prove to be extremely useful for a semantic analysis of the text, yet it introduces noise and adds little value to an analysis based on vectors from words in a text which is the case here. A function that runs through each character in the text and removes it if fits a list of punctuation, would clear the text from this noise (Figure 21).

```
In [79]:
import string

In [80]:
string.punctuation

Out[80]: '!"#$%&\'()*+,-./:;<=>?@[\\]^_`{|}~'

In [81]:
def remove_punct(text):
    text_wopunct = "".join([char for char in str(text) if char not in string.punctuation])
    return text_wopunct


In [82]:

data['abstract_clean'] = data['abstract'].apply(lambda x: remove_punct(x))

data.head(50)
```

Out[82]:

	domain	abstract	abstract_clean
0	Sistemas de Comunicacao	A great source of CO2 emission for the terrest...	A great source of CO2 emission for the terrest...
1	Ciencia da Computacao	Modeling software product lines shall imply mo...	Modeling software product lines shall imply mo...
2	Ciencia da Computacao	Software patterns are reusable solutions to pr...	Software patterns are reusable solutions to pr...
3	Ciencia da Computacao	The development of software product lines with...	The development of software product lines with...
4	Ciencia da Computacao	We've been developing software with model-driv...	Weve been developing software with modeldriven...
5	Ciencia da Computacao	The development of software product lines with...	The development of software product lines with...

Figure 21 – NLP - Removing punctuation from text

Striping the text of its punctuation also reduces the structure previously found in the text. Tokenizing separates this text in small parts (sentences or words) and provides structure to previously unstructured text. In Figure 22 the part of the sentence "Modeling Software Product" becomes [modeling, software, product]. This step is useful to prepare the text to be fed into a lexical analyzer which is exactly what the next step consists of.

```
In [121]:
import re

In [122]:
def tokenize(text):
    tokens = re.split('\W+', text)
    return tokens

In [123]:
data['abstract_tokenized'] = data['abstract_clean'].apply(lambda x: tokenize(x.lower()))


In [124]:

del data['abstract']

data.head(50)
```

Out[124]:

	domain	abstract_clean	abstract_tokenized
0	Sistemas de Comunicacao	A great source of CO2 emission for the terrest...	[a, great, source, of, co2, emission, for, the...
1	Ciencia da Computacao	Modeling software product lines shall imply mo...	[modeling, software, product, lines, shall, im...
2	Ciencia da Computacao	Software patterns are reusable solutions to pr...	[software, patterns, are, reusable, solutions,...
3	Ciencia da Computacao	The development of software product lines with...	[the, development, of, software, product, line...
4	Ciencia da Computacao	Weve been developing software with modeldriven...	[weve, been, developing, software, with, model...

Figure 22 – NLP – Text tokenizing

We now use a lexical analyzer to strip the text from the generally most common words in a language known as "stop words" as these do not add meaning to the data. NLTK contains a list of English stop-

words and this allows to run the text through a lexical analysis function that compares each word with the items on this list and removes it from our abstract text (Figure 23).

```
In [126]:
import nltk

In [127]:
stopwords = nltk.corpus.stopwords.words('english')

In [128]:
def remove_stopwords(tokenized_text):
    text = [word for word in tokenized_text if word not in stopwords]
    return text

In [129]:
data['abstract_wostopwords'] = data['abstract_tokenized'].apply(lambda x: remove_stopwords(x))

In [130]:
del data['abstract_clean']
data.head(50)
```

Out[130]:

	domain	abstract_tokenized	abstract_wostopwords
0	Sistemas de Comunicacao	[a, great, source, of, co2, emission, for, the...	[great, source, co2, emission, terrestrial, at...
1	Ciencia da Computacao	[modeling, software, product, lines, shall, im...	[modeling, software, product, lines, shall, im...
2	Ciencia da Computacao	[software, patterns, are, reusable, solutions,...	[software, patterns, reusable, solutions, prob...
3	Ciencia da Computacao	[the, development, of, software, product, line...	[development, software, product, lines, modeld...
4	Ciencia da Computacao	[weve, been, developing, software, with, model...	[weve, developing, software, modeldriven, appr...
5	Ciencia da Computacao	[the, development, of, software, product, line...	[development, software, product, lines, modeld...
6	Ciencia da Computacao	[the, alignment, of, the, software, architectu...	[alignment, software, architecture, functional...

Figure 23 – NLP - Removing stop-words from text

What remains still contains several derived words. Stemming can reduce inflected or derived words to their base or root form, useful to simplify the words in the text without losing meaning, except in a semantic analysis, which is not the case (Figure 24).

```
In [132]:
ps = nltk.PorterStemmer()

In [133]:
def stemming(tokenized_abstract):
    text=[ps.stem(word) for word in tokenized_abstract]
    return text

In [134]:
data['abstract_stemmed']=data['abstract_wostopwords'].apply (lambda x: stemming(x))

In [135]:

del data['abstract_tokenized']
data.head(50)
```

Out[135]:

	domain	abstract_wostopwords	abstract_stemmed
0	Sistemas de Comunicacao	[great, source, co2, emission, terrestrial, at...	[great, sourc, co2, emiss, terrestri, atmosphe...
1	Ciencia da Computacao	[modeling, software, product, lines, shall, im...	[model, softwar, product, line, shall, impli, ...
2	Ciencia da Computacao	[software, patterns, reusable, solutions, prob...	[softwar, pattern, reusabl, solut, problem, oc...
3	Ciencia da Computacao	[development, software, product, lines, modeld...	[develop, softwar, product, line, modeldriven,...
4	Ciencia da Computacao	[weve, developing, software, modeldriven, appr...	[weve, develop, softwar, modeldriven, approach...
5	Ciencia da Computacao	[development, software, product, lines, modeld...	[develop, softwar, product, line, modeldriven,...
6	Ciencia da Computacao	[alignment, software, architecture, functional...	[align, softwar, architectur, function, requir...
7	Ciencia da Computacao	[model, driven, approaches, shifting, software...	[model, driven, approach, shift, softwar, deve...

Figure 24 – NLP - Stemming

We can see in Figure 24 that stemming basically chops the end of the words to unmeaningful words like “sourc” or “emiss”. While the process is fast, is not very useful and can reduce accuracy in our models. On the other end, Lemmatizing uses a dictionary-based approach to do a morphological analysis of the word and determine its root form (Figure 25). This process step does not exist on Ikonomakis approach but, from analyzing the NLTK documentation, it solves the issue identified above when a root word dictionary is available.

```
In [136]:
wnl=nltk.WordNetLemmatizer()

In [137]:
nltk.download('wordnet')

[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\a6282\AppData\Roaming\nltk_data...
[nltk_data]   Package wordnet is already up-to-date!

Out[137]: True

In [138]:
def lemmatizing(tokenized_abstract):
    text=[wnl.lemmatize(word) for word in tokenized_abstract]
    return text

In [139]:
data['abstract_lemmatized'] = data['abstract_wostopwords'].apply (lambda x: lemmatizing(x))

In [140]:
data.head(50)
```

Out[140]:

	domain	abstract_wostopwords	abstract_stemmed	abstract_lemmatized
0	Sistemas de Comunicacao	[great, source, co2, emission, terrestrial, at...	[great, sourc, co2, emiss, terrestri, atmosphe...	[great, source, co2, emission, terrestrial, at...
1	Ciencia da Computacao	[modeling, software, product, lines, shall, im...	[model, softwar, product, line, shall, impli, ...	[modeling, software, product, line, shall, imp...
2	Ciencia da Computacao	[software, patterns, reusable, solutions, prob...	[softwar, pattern, reusabl, solut, problem, oc...	[software, pattern, reusable, solution, proble...
3	Ciencia da Computacao	[development, software, product, lines, modeld...	[develop, softwar, product, line, modeldriven,...	[development, software, product, line, modeldr...
4	Ciencia da Computacao	[weve, developing, software, modeldriven, appr...	[weve, develop, softwar, modeldriven, approach...	[weve, developing, software, modeldriven, appr...
5	Ciencia da Computacao	[development, software, product, lines, modeld...	[develop, softwar, product, line, modeldriven,...	[development, software, product, line, modeldr...
6	Ciencia da Computacao	[alignment, software, architecture, functional...	[align, softwar, architectur, function, requir...	[alignment, software, architecture, functional...
7	Ciencia da Computacao	[model, driven, approaches, shifting, software...	[model, driven, approach, shift, softwar, deve...	[model, driven, approach, shifting, software, ...

Figure 25 – NLP - Using a Lemmatizer to get words root form

3.3.3. Applying Machine Learning after Natural Language Processing:

Now that we have text properly “cleaned” it is time to test a collection of classifiers to understand speed and accuracy.

For all used algorithms, the resulting models will be built based on vectoring data. A TF-IDF is applied to the vectorizer on the abstract text, and the relative count of each word in the sentences is stored in a sparse matrix. TF-IDF differs from the standard TF computation that only counts terms frequency and would give more weightage to longer documents than shorter documents where IDF computes the term frequency times inverse document frequency.

For training dataset 40 elements have been populated with abstract text extracted from the location *url* in the original dataset. The original goal was to get 300 elements but this was not achieved.

Due to the relatively small size of the complete dataset, a holdout training set was not followed and a completely independent set with same probabilistic distribution was also not achieved.

The mount of features for the model was also compromised by the training dataset size, where increasing hyperparameters work better in larger datasets.

Clearly influencing the accuracy results is the leakage of data from the training dataset to the test dataset. This was intentional, again due to the small dataset, and the goal was to provide a basis to future work, including an analysis on pre-ML NLP steps and possibilities.

The following are the algorithms benchmarked for this situation:

- Multinomial naïve Bayes
- Bernoulli naïve Bayes
- Complement naïve Bayes
- Nearest centroid
- SGD - Stochastic gradient descent
- Perceptron (SGD variant)
- Linear SVC (Support Vector Classifier)
- K Nearest Neighbor
- Ridge Classifier
- Random Forest
- Passive Aggressive classifier

To accomplish that, there was the need for a few imports into the notebook:

```
from sklearn.linear_model import RidgeClassifier
from sklearn.pipeline import Pipeline
from sklearn.svm import LinearSVC
from sklearn.linear_model import SGDClassifier
from sklearn.linear_model import Perceptron
from sklearn.linear_model import PassiveAggressiveClassifier
from sklearn.naive_bayes import BernoulliNB, ComplementNB, MultinomialNB
from sklearn.neighbors import KNeighborsClassifier
from sklearn.neighbors import NearestCentroid
from sklearn.ensemble import RandomForestClassifier
```

3.3.4. Metrics

The metrics select to evaluate the models were train time, test time and accuracy.

On Figure 26 we get a chart comparing the results for each model.

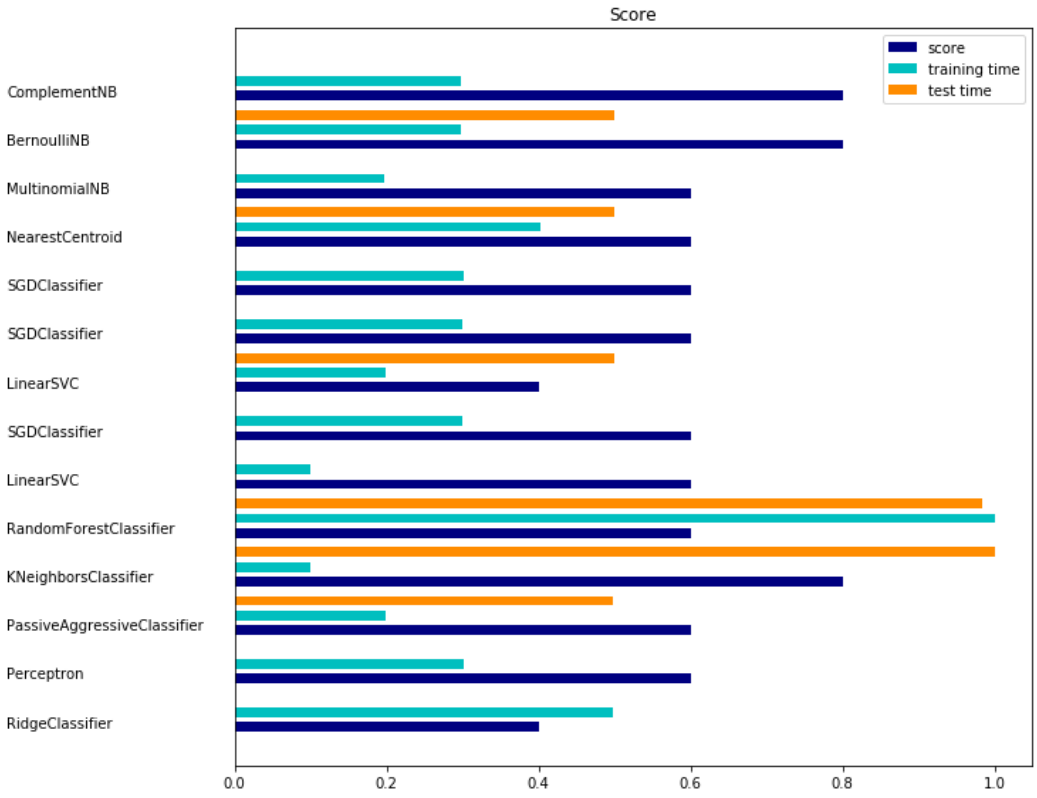


Figure 26 – Machine Learning classification results

On Table 2 we can get more detailed information not only on the results from each model but also on the parameters used (default).

With such a small dataset, there is no room for many experiments and expecting good analysis from their outcome. It would be interesting to see the effects on accuracy using other features from the available dataset.

Table 2 - Results details

Model	Parameters	Train time	Test time	Accuracy
Ridge Classifier	alpha=1.0, class_weight=None, copy_X=True, fit_intercept=True,max_iter=None, normalize=False, random_state=None, solver='sag',tol=0.01	0.005s	0.000s	40%
Perceptron	alpha=0.0001, class_weight=None, early_stopping=False, eta0=1.0, fit_intercept=True, max_iter=50, n_iter_no_change=5, n_jobs=None,penalty=None, random_state=0, shuffle=True, tol=0.001, validation_fraction=0.1, verbose=0, warm_start=False	0.003s	0.000s	60%
Passive-Aggressive	C=1.0, average=False, class_weight=None, early_stopping=False, fit_intercept=True, loss='hinge', max_iter=50, n_iter_no_change=5, n_jobs=None, random_state=None, shuffle=True, tol=0.001, validation_fraction=0.1, verbose=0, warm_start=False	0.002s	0.001s	60%
kNN	algorithm='auto', leaf_size=30, metric='minkowski',metric_params=None, n_jobs=None, n_neighbors=10, p=2, weights='uniform'	0.001s	0.002s	80%
Random forest	bootstrap=True, class_weight=None, criterion='gini',max_depth=None, max_features='auto', max_leaf_nodes=None, min_impurity_decrease=0.0, min_impurity_split=None, min_samples_leaf=1, min_samples_split=2, min_weight_fraction_leaf=0.0, n_estimators='warn', n_jobs=None, oob_score=False, random_state=None, verbose=0, warm_start=False	0.010s	0.002s	60%
NearestCentroid	metric='euclidean', shrink_threshold=None	0.004s	0.001s	60%
MultinomialNB	alpha=0.01, class_prior=None, fit_prior=True	0.002s	0.000s	60%
BernoulliNB	alpha=0.01, binarize=0.0, class_prior=None, fit_prior=True	0.003s	0.001s	80%
ComplementNB	alpha=0.1, class_prior=None, fit_prior=True, norm=False	0.003s	0.000s	80%

Given the low quantity of data available, and the fact that several potential good features were ignored with the intent to not bias the model (like author's name or research facility/group) the scores were very promising with NB and KnN models scoring 80% accuracy.

The train and test times are merely informative but would be of significance for a larger dataset. Even for the small dataset used, python NLTK revealed why there are so many works in data science using this framework, the degreed of abstraction, the quantity of tools available and the processing speed are a good surprise.

3.4 Results

After applying a variation from Ikonomakis process for NLP as pre-processor, including the Lemmatizing feature step that removes the unmeaningful words caused by the Stemming, resulted in an accuracy of 80% on NB and KnN models.

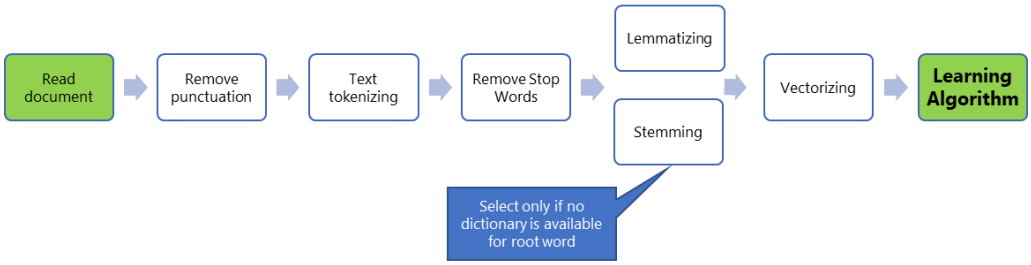


Figure 27 - Proposed process sequence.

These results can already provide a starting and promising first step as a solution for the problem.

Due to the fact that it reduces noise in vectorising the text, it would prove useful in deep learning applications, as discussed ahead in chapter 4.3-Future work.

The Case of Algoritmi showed confirmed the needs identified in the start of the project, with the same errors (while the total was not unquantified, we could detect a few), the same trends in authors affinities, and the small dataset was useful to test the text classification models.

These models can still be re-run not only to improve accuracy as we get more data to train them, in this supervised approach but also to allow to fine tune the model's parameters.

4. CONCLUSIONS

4.1 Summary of Results

Reality is different from is established and the knowledge domains of publications could have little in common to their classification which could represent a misfit taxonomy. This appeared to us in the form of publications that are misclassified for the simple reason that a person had to select a feature based on their time-limited analysis of the surface of the work.

The number of different taxonomies and their lack of depth not also increases the classification errors but also adds difficulty to the access to science knowledge already available.

Frascati strongest point is that is recognized by a broad number of international organizations but that is not enough to trade for its outdated structure and taxa. It is maintained based on the no longer valid principle of minimizing labor cost on manual classification of documents. Traditional classification schemes are also designed for traditional organizational structures like libraries where they need to address the human factor behind the classification work. They are not designed for machine classification or search engines efficiency.

The fact that indexers and on-line repositories use different taxonomy tables than the ones used by official institutions needs to be addressed and may be a sign of misalignment. As the example of FCT that uses a Frascati Manual based approach that lacks in depth and suffers of overlapping of domains and particularly sub-domains. The governmental or institutional classification models or taxonomies are designed to minimize the administrative burden, often a highly complex manual tasks and do not consider the detail level needed for scientific use.

The used dataset in the application case did not contain enough critical mass for proper evaluation of the classification models generated. Yet they were enough for proof-of-concept and a starting point for future work. This exercise also shows the relevance of text pre-processing for ML modeling. The NLP techniques are not limited to the ones experimented but this work explores the basis for a solid NLP pre-processing and ML for text analysis, more precisely text classification.

From start to end of this work the most critical aspect was data. Today data is priceless, and while available in unmeasurable amount in all its forms, good structured data is hard to get. An automated process to collect and store in a structured dataset science data from repositories must be considered if sufficient data is not available upfront. Together with a proper NLP+ML process to classify and a

visualization tool as post-processing are the tools needed for modern science browsing and would provide the proper insight researchers and academies in general demand as was observed during this work interviews.

Finally, a classification system basic principle of recognizability in mimicking the real world is hard to reach if we keep a multitude of static and hermetic taxonomies. From all the analyzed taxonomies, the one in use by Elsevier is the deepest and widest providing grounds for specific classification minimizing the risk of overlapping in sub-domains.

For proper ML applications a substantial amount of data is necessary. Data exists and should be easily extracted through API, database queries or web extracting mechanisms if necessary.

Keywords were not used for this purpose, but they would be a good classification feature, especially if they are aligned with the selected classification system. As keywords, they should net come from top-of-mind but from the classification of the object.

Authors previous work, area of expertise and affiliation can bias a ML system that is intended to classify the content of the text. Co-authorship and citations are also negatively associated to reward-based systems therefore are also weak classification features.

A future classification method or tool should be based on proper keywords usage for simple high accuracy classification method and supported by a ML algorithm to detect emerging knowledge areas or alert for misusage of keywords system.

And of course, we should never forget the impact that Web Semantics could provide to improve these models since it is expected that it would normalize in a greater scale the text used for the process. This was suggested in the initial plan but was not implemented due to a change in the project team. In this case, NLP may seem not a good approach but a multiple path algorithm is also a consideration to take for improving results without increasing complexity.

Through the course of this work we could also confirm that multi-domain production is confined into a single class preventing broad knowledge sharing. The authors try to mitigate this gap classifying into different knowledge domains every time they publish (when it happens), again, highly dependent of human biased behavior.

Python based NLTK revealed as a good environment for ML, specially providing the Lemmatizing function that solved the issues created by Stemming.

NLP as pre-processor to remove noise from the text and prepare it to be vectorized and submitted to a determined learning algorithm revealed as a useful step in a classification tool. Classic algorithms such as NB or KnN showed initial best results in accuracy but we need to test them again with more data and some more fine tuning

This is the first iteration cycle to get a solid classification tool and is to be considered as such, but it already implements and defines a path to follow. There are limitation and several considerations for improvement that emerged during the work.

4.2 Work limitations

Available data was not enough to build an Ontology and a Machine Learning text classifier relying on supervised learning is highly dependent on the amount of training data available. Unfortunately, it is generally a labor-intense task unless we can provide a text extraction mechanism.

4.3 Future work

This exercise was somehow limited by the size of the available dataset and important features were removed to avoid biased models. The use of features such as author, co-authors and their affiliation need to be reevaluated with a richer dataset.

Computational Scientometrics measurement techniques such as bibliometrics or citation analysis could be included in the models features to increase accuracy and provide not only the possibility to classify Research Topics or Knowledge Domains but also trends and new sub-domains.

Exploring the application of Maximum Entropy for Text Classification can, in some situations (Nigam et al., n.d.), increase the accuracy or decrease the number of errors in a classifier, yet it suffers from overfitting and poor feature selection.

To be explored is also the integration of more complex ontology-based knowledge in classification, and the development of more efficient non-associative classification algorithms which integrate taxonomy information in classifier training and the use of deep learning (Fujita & Cimr, 2019), an algorithm which has no theoretical limitations of what it can learn; the more data you give and the more computational time you provide, the better it is and have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics (LeCun et al., 2015).

From the system perspective, the possibility to include the taxonomic classes into the keywords is also a possibility to be explored by the regulatory institutions.

Finally, there is a need to properly classify into multiple knowledge domains and a classification tool must take this into consideration. Taxonomies are not, or should not have a high frequency of mutation, yet they should have capacity to absorb new areas while preventing unintentional misclassification. When two or more knowledge domains collaborate, they do not necessarily create a new domain and during their short or long collaboration it should the possibility to identify each contribution to the text would be interesting to identify and quantify these phenomena.

REFERENCES

Akhmetov, I., Pak, A., Ualiyeva, I., & Gelbukh, A. (2020). Highly Language-Independent Word Lemmatization Using a Machine-Learning Classifier. *Computación y Sistemas*, *24*(3), Article 3. https://doi.org/10.13053/cys-24-3-3775

Algoritmi IE Publications list. (2018). Http://Algoritmi.Uminho.Pt/Research-Teams/Ie/. http://algoritmi.uminho.pt/research-teams/ie/

Aman, S., & Szpakowicz, S. (2008). Using Roget's Thesaurus for Fine-grained Emotion Recognition. *2008*, 7.

Araujo, L. (2003). Symbiosis of Evolutionary Techniques and Statistical Natural Language Processing. *IEEE Transactions on Evolutionary Computation*, *8*, 14–27.

Atkinson-abutridy, J., Mellish, C., & Aitken, S. (2003). A semantically guided and domain-independent evolutionary model for knowledge discovery from texts. *IEEE Trans. Evol. Comput*, 546–560.

Brewster, C., & Wilks, Y. (2004). *Ontologies, Taxonomies, Thesauri: Learning from Texts*. 32.

Brill, E. (1995). Transformation-Based-Error-Driven Learning and Natural Language Processing: A Case Study in Part-of-Speech Tagging. *Computational Linguistics*, *2*(4). http://aclweb.org/anthology/J/J95/J95-4004

Bruce, R., & Wiebe, J. (1994). Word-sense disambiguation using decomposable models. *Proceedings of the 32nd Annual Meeting on Association for Computational Linguistics*, 139–146. https://doi.org/10.3115/981732.981752

Cambria and White—2014—Jumping NLP Curves A Review of Natural Language P.pdf. (n.d.). Retrieved November 10, 2018, from http://sentic.net/jumping-nlp-curves.pdf

Cambria, E., & White, B. (2014). Jumping NLP Curves: A Review of Natural Language Processing Research [Review Article]. *IEEE Computational Intelligence Magazine*, *9*(2), 48–57. https://doi.org/10.1109/MCI.2014.2307227

Carvalho, J. P., Batista, F., & Coheur, L. (2012). A critical survey on the use of Fuzzy Sets in Speech and Natural Language Processing. *2012 IEEE International Conference on Fuzzy Systems*, 1–8. https://doi.org/10.1109/FUZZ-IEEE.2012.6250803

Centro ALGORITMI - Universidade do Minho. (2018). http://algoritmi.uminho.pt/

Chouhan, A., & Prabhune, A. (2019). FIF: A NLP-based Feature Identification Framework for Data Warehouses. *2019 IEEE/WIC/ACM International Conference on Web Intelligence (WI)*, 276–281.

Comte, A. (1988). *Introduction to Positive Philosophy*. Hackett Publishing.

Costagliola, G., Fuccella, V., Giordano, M., & Polese, G. (2009). Monitoring Online Tests through Data Visualization. *IEEE Trans. Knowl. Data Eng.*, *21*, 773–784. https://doi.org/10.1109/TKDE.2008.133

Diab, S. (2019). Optimizing Stochastic Gradient Descent in Text Classification Based on Fine-Tuning Hyper-Parameters Approach. A Case Study on Automatic Classification of Global Terrorist Attacks. *ArXiv:1902.06542 [Cs, Stat]*. http://arxiv.org/abs/1902.06542

Fayyad, U., Piatetsky-Shapiro, G., & Smyth, P. (1996). From Data Mining to Knowledge Discovery in Databases. *AI Magazine*, *17*(3).

FCT - Fundação para a Ciência e a Tecnologia. (2019, October 20). https://www.fct.pt/

Friedman, C., Rindflesch, T. C., & Corn, M. (2013). Natural language processing: State of the art and prospects for significant progress, a workshop sponsored by the National Library of Medicine. *Journal of Biomedical Informatics*, *46*(5), 765–773. https://doi.org/10.1016/j.jbi.2013.06.004

Frodeman, R., & Klein, J. T. (Eds.). (2012). *The Oxford handbook of interdisciplinarity*. Oxford Univ. Press.

Fujita, H., & Cimr, D. (2019). Computer Aided detection for fibrillations and flutters using deep convolutional neural network. *Information Sciences*, *486*, 231–239. https://doi.org/10.1016/j.ins.2019.02.065

Godin, B. (2009). The making of science, technology and innovation policy: Conceptual frameworks as narratives, 1945-2005. *URL: Http://Cci. English. Ucsb. Edu/Wp-Content/Uploads/2009/11/B_godin_3iricec_042009. Pdf*.

Grefenstette, G. (1994). *Explorations in Automatic Thesaurus Discovery*. Springer US. https://doi.org/10.1007/978-1-4615-2710-7

Gulbrandsen, M., & Kyvik, S. (2010). Are the concepts basic research, applied research and experimental development still useful? An empirical investigation among Norwegian academics. *Science and Public Policy*, *37*(5), 343–353.

Hospedales, T. M., Shaogang Gong, & Tao Xiang. (2013). Finding Rare Classes: Active Learning with Generative and Discriminative Models. *IEEE Transactions on Knowledge and Data Engineering*, *25*(2), 374–386. https://doi.org/10.1109/TKDE.2011.231

Ikonomakis, E., Kotsiantis, S., & Tampakas, V. (2005). Text Classification Using Machine Learning Techniques. *WSEAS Transactions on Computers*, *4*, 966–974.

Joachims, T. (1998). Text categorization with support vector machines: Learning with many relevant features. *European Conference on Machine Learning*, 137–142.

Jones, K. S. (2005). Some thoughts on classification for retrieval. *Journal of Documentation*, *61*(5), 571–581.

Kacprzyk, J., & Zadrozny, S. (2010). Computing With Words Is an Implementable Paradigm: Fuzzy Queries, Linguistic Data Summaries, and Natural-Language Generation. *IEEE Transactions on Fuzzy Systems*, *18*(3), 461–472. https://doi.org/10.1109/TFUZZ.2010.2040480

Kopácsi, S., Hudak, R., & Ganguly, R. (2017). Implementation of a classification server to support metadata organization for long term preservation systems. *Mitteilungen Der Vereinigung Österreichischer Bibliothekarinnen Und Bibliothekare*, *70*(2), 225–243.

Kotsiantis, S. B., Zaharakis, I., & Pintelas, P. (2007). Supervised machine learning: A review of classification techniques. *Emerging Artificial Intelligence Applications in Computer Engineering*, *160*, 3–24.

Kou, G., Yang, P., Peng, Y., Xiao, F., Chen, Y., & Alsaadi, F. E. (2020). Evaluation of feature selection methods for text classification with small datasets using multiple criteria decision-making methods. *Applied Soft Computing*, *86*, 105836. https://doi.org/10.1016/j.asoc.2019.105836

LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, *521*(7553), 436–444.

Leon Manifesto. (2007). http://www.iskoi.org/ilc/leon.php

Lodhi, H., Saunders, C., Shawe-Taylor, J., Cristianini, N., & Watkins, C. (2002). Text classification using string kernels. *Journal of Machine Learning Research*, *2*(Feb), 419–444.

Lopez, M. M., & Kalita, J. (2017). Deep Learning applied to NLP. *ArXiv:1703.03091 [Cs]*. http://arxiv.org/abs/1703.03091

Manda, P., Ozkan, S., Wang, H., & Bridges, S. M. (2012). *Cross-Ontology Multi-level Association Rule Mining in the Gene Ontology*.

Manning, C. D., Manning, C. D., & Schütze, H. (1999). *Foundations of statistical natural language processing*. MIT press.

Nigam, K., Lafferty, J., & McCallum, A. (n.d.). *Using Maximum Entropy for Text Classification*. 7.

O'Brien, R. (1998). *An Overview of the Methodological Approach of Action Research*.

OECD. (2015). *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development*. OECD. https://doi.org/10.1787/9789264239012-en

OWL - Semantic Web Standards. (2012, December 11). https://www.w3.org/OWL/

Patil, S., Gune, A., & Nene, M. (2017). Convolutional neural networks for text categorization with latent semantic analysis. *2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)*, 499–503. https://doi.org/10.1109/ICECDS.2017.8390217

Porter, A. L., & Rafols, I. (2009). Is science becoming more interdisciplinary? Measuring and mapping six research fields over time. *Scientometrics*, *81*(3), 719–745. https://doi.org/10.1007/s11192-008-2197-2

Rich, P. (1992). The Organizational Taxonomy: Definition and Design. *The Academy of Management Review*, *17*(4), 758–781. https://doi.org/10.2307/258807

Rubinstein, Y. D., & Hastie, T. (1997). *Discriminative vs Informative Learning*. *5*, 49–53.

Singh, G., Kumar, B., Gaur, L., & Tyagi, A. (2019). Comparison between Multinomial and Bernoulli Naïve Bayes for Text Classification. *2019 International Conference on Automation, Computational and Technology Management (ICACTM)*, 593–596. https://doi.org/10.1109/ICACTM.2019.8776800

Studer, R., Benjamins, V. R., & Fensel, D. (1998). Knowledge engineering: Principles and methods. *Data & Knowledge Engineering*, *25*(1–2), 161–197. https://doi.org/10.1016/S0169-023X(97)00056-6

Subasic, P., & Huettner, A. (2000). *Affect Analysis of Text Using Fuzzy Semantic Typing*.

Szostak, R. (2008). Classification, interdisciplinarity, and the study of science. *Journal of Documentation*, *64*(3), 319–332. https://doi.org/10.1108/00220410810867551

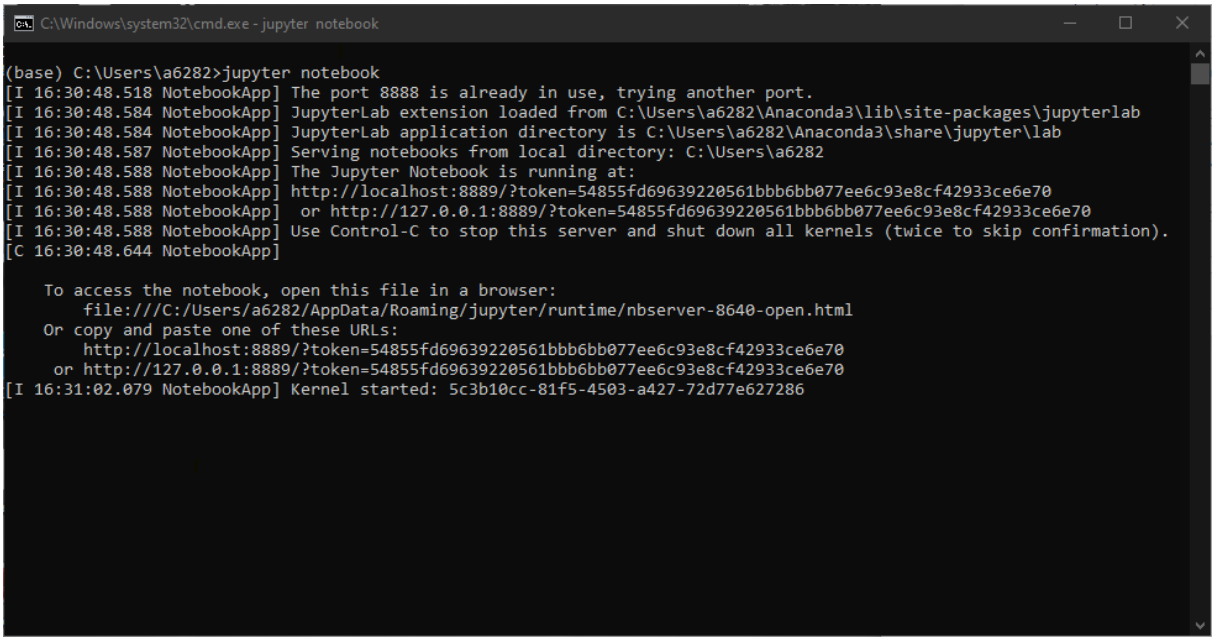
Toman, M., Tesar, R., & Jezek, K. (2006). *Influence of Word Normalization on Text Classification*.

Verma, P., Goyal, A., & Gigras, Y. (2020). Email phishing: Text classification using natural language processing. *Computer Science and Information Technologies*, *1*(1), 1–12. https://doi.org/10.11591/csit.v1i1.p1-12

Yu, M.-C., Wu, Y.-C. J., Alhalabi, W., Kao, H.-Y., & Wu, W.-H. (2016). ResearchGate: An effective altmetric indicator for active researchers? *Computers in Human Behavior*, *55*, 1001–1006.

APPENDIX I – SOLUTION SUPPORT MATERIAL IN JUPYTER

Using Jupyter notebook to process dataset



Jupiter notebook source:

In [1]:

```
import nltk
import logging
import numpy as np
from optparse import OptionParser
import sys
from time import time
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.feature_extraction.text import HashingVectorizer
from sklearn.feature_selection import SelectFromModel
from sklearn.feature_selection import SelectKBest, chi2
```

```
from sklearn.linear_model import RidgeClassifier
from sklearn.pipeline import Pipeline
from sklearn.svm import LinearSVC
from sklearn.linear_model import SGDClassifier
from sklearn.linear_model import Perceptron
from sklearn.linear_model import PassiveAggressiveClassifier
from sklearn.naive_bayes import BernoulliNB, ComplementNB, MultinomialNB
from sklearn.neighbors import KNeighborsClassifier
from sklearn.neighbors import NearestCentroid
from sklearn.ensemble import RandomForestClassifier
from sklearn.utils.extmath import density
from sklearn import metrics
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.feature_extraction.text import TfidfTransformer

print("Loading dataset")
import pandas as panda
data_train = panda.read_csv('TrainDataset.tsv', sep='\t',
names=['target','data'], header=None)
data_test = panda.read_csv('TestDataset.tsv', sep='\t',
names=['target','data'], header=None)
print('data loaded')

# order of labels in `target_names` can be different from `categories`
target_names = data_train.target

def size_mb(docs):
    return sum(len(s.encode('utf-8')) for s in docs) / 1e6

data_train_size_mb = size_mb(data_train.data)
data_test_size_mb = size_mb(data_test.data)

print("%d articles - %0.3fMB (training set)" % (
    len(data_train.data), data_train_size_mb))
print("%d articles - %0.3fMB (test set)" % (
    len(data_test.data), data_test_size_mb))
print("%d categories" % len(target_names))
print()

# split a training set and a test set
```

```
    y_train, y_test = data_train.target, data_test.target
    print("Features extraction using a sparse vectorizer")
    t0 = time()
    vectorizer = TfidfVectorizer(sublinear_tf=True, max_df=0.5,
stop_words='english')
    X_train = vectorizer.fit_transform(data_train.data)

    duration = time() - t0
    print("done in %fs at %0.3fMB/s" % (duration, data_train_size_mb / duration))
    print("n_samples: %d, n_features: %d" % X_train.shape)
    print()

    print("Features extraction using same vectorizer ")
    t0 = time()
    X_test = vectorizer.transform(data_test.data)

    duration = time() - t0
    print("done in %fs at %0.3fMB/s" % (duration, data_test_size_mb / duration))
    print("n_samples: %d, n_features: %d" % X_test.shape)
    print()

    feature_names = vectorizer.get_feature_names()
```

```
    In [3]:
```

```
    #clean data

    import string
    string.punctuation
    def remove_punct(text):
        text_wopunct = "".join([char for char in str(text) if char not in
string.punctuation])
        return text_wopunct
```

```
    In [4]:
```

```
    import re
    def tokenize(text):
        tokens = re.split('\W+', text)
        return tokens
```

```
    In [5]:
```

```
#Lemmatizing
wnl=nltk.WordNetLemmatizer()
nltk.download('wordnet')
def lemmatizing(tokenized_abstract):
    text=[wnl.lemmatize(word) for word in tokenized_abstract]
    return text
```

```
In [6]:
  #Benchmarking
def benchmark(clf):
    print('_' * 80)
    print("Training: ")
    print(clf)
    t0 = time()

    clf.fit(X_train, y_train)
    train_time = time() - t0
    print("train time: %0.3fs" % train_time)

    t0 = time()
    pred = clf.predict(X_test)

    test_time = time() - t0
    print("test time:  %0.3fs" % test_time)

    score = metrics.accuracy_score(y_test, pred)
    print("accuracy:   %0.3f" % score)

    print("dimensionality: %d" % clf.coef_.shape[1])
    print("density: %f" % density(clf.coef_))
    print("confusion matrix:")
    print(metrics.confusion_matrix(y_test, pred))
    print()
    clf_descr = str(clf).split('(')[0]
    return clf_descr, score, train_time, test_time

results = []
for clf, name in (
        (RidgeClassifier(tol=1e-2, solver="sag"), "Ridge Classifier"),
```

```
        (Perceptron(max_iter=50), "Perceptron"),
        (PassiveAggressiveClassifier(max_iter=50),
         "Passive-Aggressive"),
        (KNeighborsClassifier(n_neighbors=10), "kNN"),
        (RandomForestClassifier(), "Random forest")):
    print('=' * 80)
    print(name)
    results.append(benchmark(clf))

for penalty in ["l2", "l1"]:
    print('=' * 80)
    print("%s penalty" % penalty.upper())
    # Train Liblinear model
    results.append(benchmark(LinearSVC(penalty=penalty, dual=False,
                                       tol=1e-3)))

    # Train SGD model
    results.append(benchmark(SGDClassifier(alpha=.0001, max_iter=50,
                                           penalty=penalty)))

# Train SGD with Elastic Net penalty
print('=' * 80)
print("Elastic-Net penalty")
results.append(benchmark(SGDClassifier(alpha=.0001, max_iter=50,
                                       penalty="elasticnet")))

# Train NearestCentroid without threshold
print('=' * 80)
print("NearestCentroid")
results.append(benchmark(NearestCentroid()))

# Train sparse Naive Bayes classifiers
print('=' * 80)
print("Naive Bayes")
results.append(benchmark(MultinomialNB(alpha=.01)))
results.append(benchmark(BernoulliNB(alpha=.01)))
results.append(benchmark(ComplementNB(alpha=.1)))
```

APPENDIX II – AUTHORIZATION

From: Pedro Miguel Ferreira Martins Arezes
Sent: Monday, November 19, 2018 12:29 PM
To: Carlos Vicente da Silva Nunes
Subject: Re: Autorização para uso de informação

Caro Carlos
Não estou certo de ter compreendido o que me pede mas acho que não existe problema em citar esse trabalho.
Note que eu não sou o primeiro autor (Calado, A.) mas o último (Arezes, P.)-
Cumprimentos,
PA

> On 18 Nov 2018, at 22:39, Carlos Vicente da Silva Nunes <a62824@alunos.uminho.pt> wrote:
>
> Boa noite Caro Professor Pedro Calado,
>
> No âmbito da minha tese de Mestrado sob o tema "An Antology and Machine Learning Classification of Knowledge Domains" venho por este meio pedir autorização para usar uma captura de ecrã das últimas publicações do grupo IE do centro Algoritmi:
>
> <18C2D9109949419D9F3862263DDA9441.jpg>
>
> No meu trabalho pretendo utilizar a imagem para representar um problema que hoje existe na classificação de artigos científicos.
>
> Pela mesma razão gostaria de obter a sua opinião sobre o parágrafo que citará a imagem: "Calado,A is a EHF researcher that also publishes on IE group. From the title analysis we could relate this publication to EHF research group, but would take a text, or at least a abstract analysis to determine the correct knowledge domain of his work."
>
> Uma vez que não tive acesso ao artigo não tenho elementos para além to título para verificar o correto domínio do mesmo. Agradeço se me puder ajudar explicando o conteúdo do mesmo e a razão pela qual está classificado como um artigo do grupo IE quando, apenas pelo título, parece ser uma publicação que se enquadra no grupo EHF. Uma breve descrição seria suficiente, pretendo apenas conhecer as dificuldades que os investigadores possam ter com o sistema atual.
>
> Antecipadamente grato pela sua disponibilidade,
>
> Saudações
>
> Carlos Nunes
> (a62824)

APPENDIX III – FCT TAXONOMY SCHEME

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

DOMÍNIOS CIENTÍFICOS E ÁREAS CIENTÍFICAS

Ciências da Vida e da Saúde

Área Científica	Subárea Científica	Sigla
Neurociências, Envelhecimento e Doenças Degenerativas	Neurociências - Molecular e Celular	NEU-NMC
	Neurociências - Sistemas, Clínica e Comportamento	NEU-SCC
	Biologia do Envelhecimento	NEU-BEN
	Degeneração de Orgãos e Sistemas	NEU-OSD
Imunologia e Infeção	Imunologia e Inflamação	IMI-IMU
	Microbiologia e Infeção	IMI-MIC
Diagnóstico, Terapêutica e Saúde Pública	Epidemiologia	DTP-EPI
	Saúde Pública e Fatores Ambientais	DTP-SAP
	Farmacologia e Toxicologia	DTP-FTO
	Fisiologia do Exercício e Ciências do Desporto	DTP-DES
	Investigação Clínica	DTP-PIC
Biomedicina	Oncobiologia	BIM-ONC
	Mecanismos da Doença	BIM-MEC
	Metabolismo e Nutrição	BIM-MET
	Medicina Regenerativa	BIM-MED
Biologia Experimental	Genética e Genómica	BEX-GMG
	Biologia Celular e Molecular	BEX-BCM
	Biologia do Desenvolvimento	BEX-BID
	Biologia Computacional e Bioinformática	BEX-BCB

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Ciências Exatas e da Engenharia

Área Científica	Subárea Científica	Sigla
Ciência e Engenharia de Materiais	Biomateriais	CTM-BIO
	Cerâmica e Vidro	CTM-CER
	Materiais para Produção e Armazenamento de Energia	CTM-ENE
	Nanomateriais e Dispositivos	CTM-NAN
	Polímeros e Compósitos	CTM-POL
	Materiais Estruturais	CTM-MAT
Bioengenharia, Biotecnologia e Bioquímica	Engenharia Biológica	BBB-EBI
	Engenharia Metabólica e Fisiologia Microbiana	BBB-MET
	Biologia Sintética e de Sistemas	BBB-BSS
	Engenharia de Bioprocessos e Biocatálise	BBB-EBB
	Engenharia Celular e de Tecidos	BBB-ECT
	Biotecnologia	BBB-BIO
	Nanobiotecnologia e Biossensores	BBB-NAN
	Engenharia Biomédica	BBB-BMD
	Imagem e Biossinais	BBB-IMG
	Biomecânica	BBB-BMC
	Biologia Estrutural e Proteómica	BBB-BEP
	Bioquímica e Biofísica	BBB-BQB
Engenharia Civil e Minas	Estruturas	ECM-EST
	Transportes	ECM-TRA
	Urbanismo	ECM-URB
	Geotecnia	ECM-GEO
	Hidráulica	ECM-HID
	Construções	ECM-COM
	Engenharia de Minas	ECM-MIN
Engenharia Eletrotécnica e Engenharia Informática	Automação, Controlo e Robótica	EEI-AUT
	Eletrónica e Computadores	EEI-ELC
	Energia Elétrica	EEI-EEL
	Processamento de Sinal	EEI-PRO
	Telecomunicações	EEI-TEL
	Ciência e Tecnologia da Programação	EEI-CTP
	Engenharia de Software e Sistemas de Informação	EEI-ESS
	Sistemas Inteligentes, Interação e Multimédia	EEI-SII
Engenharia Mecânica e Sistemas de Engenharia	Sistemas de Automação e Robótica	EMS-CRO
	Gestão Industrial	EMS-GIN
	Energia e Ambiente	EMS-ENE
	Projeto Mecânico	EMS-PRO
	Tecnologia Mecânica	EMS-TEC
	Transportes	EMS-TRA
	Sistemas de Engenharia	EMS-SIS
Física	Física Nuclear, Partículas Elementares e Altas Energias	FIS-NUC
	Física Atómica e Molecular	FIS-ATO
	Física dos Plasmas e Fusão Nuclear	FIS-PLA
	Física da Matéria Condensada e Nanotecnologia	FIS-NAN
	Ótica e Fotónica	FIS-OPT
	Astronomia e Astrofísica	FIS-AST

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Área Científica	Subárea Científica	Sigla
Matemática	Álgebra e Combinatória	MAT-ALG
	Análise	MAT-ANA
	Análise Numérica, Otimização e Modelação Matemática	MAT-NAN
	Cálculo de Variações, Equações Diferenciais e Sistemas Dinâmicos	MAT-CAL
	Geometria e Topologia	MAT-GEO
	Lógica e Teoria da Computação	MAT-LOG
	Estatística, Processos Estocásticos e Análise Estocástica	MAT-STA
Química e Engenharia Química	Química Física	QEQ-QFI
	Química Orgânica	QEQ-QOR
	Química Inorgânica	QEQ-QIN
	Química Analítica	QEQ-QAN
	Química Supramolecular	QEQ-SUP
	Química Computacional	QEQ-COM
	Química Medicinal	QEQ-MED
	Engenharia da Reação Química	QEQ-ERQ
	Engenharia de Produto	QEQ-EPR
	Engenharia de Processos e Sistemas	QEQ-EPS
	Processos de Separação	QEQ-PRS
	Fenómenos de Transporte e Termodinâmica	QEQ-FTT

(Esta tabela refere-se à continuação do domínio científico "Ciências Exatas e da Engenharia")

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Ciências Naturais e do Ambiente

Área Científica	Subárea Científica	Sigla
Ambiente e Alterações Globais	Alterações Ambientais Globais	AAG-GLO
	Gestão Sustentável de Recursos	AAG-REC
	Tecnologias Ambientais	AAG-TEC
	Modelação e Avaliação Ambiental	AAG-MAA
Ciência Animal e Ciências Veterinárias	Produção e Bem-estar Animal	CVT-WEL
	Sanidade Animal e Epidemiologia	CVT-EPI
	Nutrição Animal	CVT-NUT
	Melhoramento e Genómica Animal	CVT-GEN
	Tecnologias de Reprodução	CVT-REP
	Biodiversidade e Conservação de Raças Autóctones	CVT-LIV
Agricultura e Ciências Florestais	Ciências Florestais	AGR-FOR
	Produção Agrícola	AGR-PRO
	Tecnologia de Produtos de Base Biológica	AGR-TEC
Ciências Biológicas	Biodiversidade e Conservação	BIA-BIC
	Biologia Microbiana	BIA-MIC
	Evolução e Filogenia	BIA-EVF
	Biologia de Plantas	BIA-PLA
	Biologia Animal	BIA-ANM
Geociências	Meteorologia e Clima	GEO-MET
	Geofísica e Geoquímica	GEO-FIQ
	Geologia	GEO-GEO
	Deteção Remota e Geodesia	GEO-REM
Ciências do Mar	Sistemas Oceânicos e do Mar Profundo	MAR-PRO
	Sistemas Estuarinos, Costeiros e Litorais	MAR-EST
	Biotecnologia Marinha, Pescas e Aquacultura	MAR-BIO
	Energia e Tecnologias Marinhas	MAR-TEC

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Ciências Sociais e Humanidades

Área Científica	Subárea Científica	Sigla
Indivíduos, Instituições e Mercados	Economia	IIM-ECO
	Finanças	IIM-FIN
	Gestão	IIM-GES
Instituições, Valores, Crenças e Comportamento	Sociologia	IVC-SOC
	Antropologia	IVC-ANT
	Ciência Política	IVC-CPO
	Ciências Jurídicas	IVC-JUR
	Ciências da Comunicação e da Informação	IVC-COM
	Políticas de Educação e de Ciência	IVC-PEC
	História e Filosofia da Ciência e da Tecnologia	IVC-HFC
	Estudos Sociais da Ciência e da Tecnologia	IVC-ESCT
Ambiente, Território e População	Geografia	ATP-GEO
	Demografia	ATP-DEM
	Estudos Urbanos e Regionais	ATP-EUR
	Estudos Ambientais	ATP-EAM
	Arquitetura	ATP-AQI
	Arquitetura Paisagista	ATP-ARP
A Mente Humana e a sua Complexidade	Psicologia Aplicada	MHC-PAP
	Psicologia Clínica e Avaliação Psicológica	MHC-PCL
	Psicologia Cognitiva, Neuropsicologia e Cognição Social	MHC-PCN
	Psicologia da Educação e do Desenvolvimento	MHC-PED
	Psicologia da Saúde e Comunitária	MHC-PSC
	Psicologia Social e das Organizações	MHC-PSO
	Linguística	MHC-LIN
	Ciências da Educação	MHC-CED
	Filosofia	MHC-FIL
	Ética	MHC-ETI
	Religião	MHC-REL
Culturas e produção cultural	Estudos Literários	CPC-ELT
	Estudos Artísticos	CPC-EAT
	Artes Visuais	CPC-VIS
	Artes Performativas	CPC-PER
	Design	CPC-DES
	Artes Multimédia	CPC-ARM
	Música e Musicologia	CPC-MMU
	Estudos Comparados	CPC-CMP
	História da Arte	CPC-HAT
Estudo do Passado Humano	Arqueologia	EPH-ARQ
	História	EPH-HIS
	Património Cultural	EPH-PAT

APPENDIX IV – WEB OF SCIENCE SUBJECT CLASSIFICATION

General Categories	Subject Areas
Arts & Humanities	Arts & Humanities - Other Topics
Arts & Humanities	Architecture
Arts & Humanities	Art
Arts & Humanities	Asian Studies
Arts & Humanities	Classics
Arts & Humanities	Dance
Arts & Humanities	Film, Radio & Television
Arts & Humanities	History
Arts & Humanities	History & Philosophy of Science
Arts & Humanities	Literature
Arts & Humanities	Music
Arts & Humanities	Philosophy
Arts & Humanities	Religion
Arts & Humanities	Theater
Science & Technology	Science & Technology - Other Topics
Science & Technology	Life Sciences & Biomedicine - Other Topics
Science & Technology	Agriculture
Science & Technology	Allergy
Science & Technology	Anatomy & Morphology
Science & Technology	Anesthesiology
Science & Technology	Anthropology
Science & Technology	Behavioral Sciences
Science & Technology	Biochemistry & Molecular Biology
Science & Technology	Biodiversity & Conservation
Science & Technology	Biophysics
Science & Technology	Biotechnology & Applied Microbiology
Science & Technology	Cardiovascular System & Cardiology
Science & Technology	Cell Biology
Science & Technology	Critical Care Medicine
Science & Technology	Dentistry, Oral Surgery & Medicine
Science & Technology	Dermatology
Science & Technology	Developmental Biology
Science & Technology	Emergency Medicine
Science & Technology	Endocrinology & Metabolism
Science & Technology	Entomology
Science & Technology	Environmental Sciences & Ecology
Science & Technology	Evolutionary Biology
Science & Technology	Fisheries
Science & Technology	Food Science & Technology
Science & Technology	Forestry
Science & Technology	Gastroenterology & Hepatology
Science & Technology	General & Internal Medicine

Science & Technology	Genetics & Heredity
Science & Technology	Geriatrics & Gerontology
Science & Technology	Health Care Sciences & Services
Science & Technology	Hematology
Science & Technology	Immunology
Science & Technology	Infectious Diseases
Science & Technology	Integrative & Complementary Medicine
Science & Technology	Legal Medicine
Science & Technology	Marine & Freshwater Biology
Science & Technology	Mathematical & Computational Biology
Science & Technology	Medical Ethics
Science & Technology	Medical Informatics
Science & Technology	Medical Laboratory Technology
Science & Technology	Microbiology
Science & Technology	Mycology
Science & Technology	Neurosciences & Neurology
Science & Technology	Nursing
Science & Technology	Nutrition & Dietetics
Science & Technology	Obstetrics & Gynecology
Science & Technology	Oncology
Science & Technology	Ophthalmology
Science & Technology	Orthopedics
Science & Technology	Otorhinolaryngology
Science & Technology	Paleontology
Science & Technology	Parasitology
Science & Technology	Pathology
Science & Technology	Pediatrics
Science & Technology	Pharmacology & Pharmacy
Science & Technology	Physiology
Science & Technology	Plant Sciences
Science & Technology	Psychiatry
Science & Technology	Public, Environmental & Occupational Health
Science & Technology	Radiology, Nuclear Medicine & Medical Imaging
Science & Technology	Rehabilitation
Science & Technology	Reproductive Biology
Science & Technology	Research & Experimental Medicine
Science & Technology	Respiratory System
Science & Technology	Rheumatology
Science & Technology	Sport Sciences
Science & Technology	Substance Abuse
Science & Technology	Surgery
Science & Technology	Toxicology
Science & Technology	Transplantation
Science & Technology	Tropical Medicine
Science & Technology	Urology & Nephrology
Science & Technology	Veterinary Sciences
Science & Technology	Virology
Science & Technology	Zoology
Science & Technology	Physical Sciences - Other Topics

Science & Technology	Astronomy & Astrophysics
Science & Technology	Chemistry
Science & Technology	Crystallography
Science & Technology	Electrochemistry
Science & Technology	Geochemistry & Geophysics
Science & Technology	Geology
Science & Technology	Mathematics
Science & Technology	Meteorology & Atmospheric Sciences
Science & Technology	Mineralogy
Science & Technology	Mining & Mineral Processing
Science & Technology	Oceanography
Science & Technology	Optics
Science & Technology	Physical Geography
Science & Technology	Physics
Science & Technology	Polymer Science
Science & Technology	Thermodynamics
Science & Technology	Water Resources
Science & Technology	Technology - Other Topics
Science & Technology	Acoustics
Science & Technology	Automation & Control Systems
Science & Technology	Computer Science
Science & Technology	Construction & Building Technology
Science & Technology	Energy & Fuels
Science & Technology	Engineering
Science & Technology	Imaging Science & Photographic Technology
Science & Technology	Information Science & Library Science
Science & Technology	Instruments & Instrumentation
Science & Technology	Materials Science
Science & Technology	Mechanics
Science & Technology	Metallurgy & Metallurgical Engineering
Science & Technology	Microscopy
Science & Technology	Nuclear Science & Technology
Science & Technology	Operations Research & Management Science
Science & Technology	Remote Sensing
Science & Technology	Robotics
Science & Technology	Spectroscopy
Science & Technology	Telecommunications
Science & Technology	Transportation
Social Sciences	Social Sciences - Other Topics
Social Sciences	Archaeology
Social Sciences	Area Studies
Social Sciences	Biomedical Social Sciences
Social Sciences	Business & Economics
Social Sciences	Communication
Social Sciences	Criminology & Penology
Social Sciences	Cultural Studies
Social Sciences	Demography
Social Sciences	Education & Educational Research
Social Sciences	Ethnic Studies

Social Sciences	Family Studies
Social Sciences	Geography
Social Sciences	Government & Law
Social Sciences	International Relations
Social Sciences	Linguistics
Social Sciences	Mathematical Methods In Social Sciences
Social Sciences	Psychology
Social Sciences	Public Administration
Social Sciences	Social Issues
Social Sciences	Social Work
Social Sciences	Sociology
Social Sciences	Urban Studies
Social Sciences	Women's Studies

APPENDIX V - THE FRASCATI MANUAL

The Frascati Manual is an internationally recognized methodology for collecting and using R&D statistics. It includes definitions of basic concepts, data collection guidelines, and classifications for compiling R&D statistics.

APPENDIX VI - WEB OF SCIENCE MAPPING TO FRASCATI

The following table shows the category mapping the Revised Field of Science and Technology (FOS) to the Classification of the Frascati Manual 2002.

Description	WoS Code	WoS Description
1 NATURAL SCIENCES	QL	LOGIC
1 NATURAL SCIENCES	PN	MATHEMATICS, APPLIED
1 NATURAL SCIENCES	PO	MATHEMATICS, INTERDISCIPLINARY APPLICATIONS
1 NATURAL SCIENCES	PQ	MATHEMATICS
1 NATURAL SCIENCES	UR	PHYSICS, MATHEMATICAL
1 NATURAL SCIENCES	XY	STATISTICS & PROBABILITY
1 NATURAL SCIENCES	EP	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE
1 NATURAL SCIENCES	ER	COMPUTER SCIENCE, CYBERNETICS
1 NATURAL SCIENCES	ET	COMPUTER SCIENCE, INFORMATION SYSTEMS
1 NATURAL SCIENCES	EV	COMPUTER SCIENCE, INTERDISCIPLINARY APPLICATIONS
1 NATURAL SCIENCES	EW	COMPUTER SCIENCE, SOFTWARE ENGINEERING
1 NATURAL SCIENCES	EX	COMPUTER SCIENCE, THEORY & METHODS
1 NATURAL SCIENCES	AA	ACOUSTICS
1 NATURAL SCIENCES	BU	ASTRONOMY & ASTROPHYSICS
1 NATURAL SCIENCES	SY	OPTICS
1 NATURAL SCIENCES	UB	PHYSICS, APPLIED
1 NATURAL SCIENCES	UF	PHYSICS, FLUIDS & PLASMAS
1 NATURAL SCIENCES	UH	PHYSICS, ATOMIC, MOLECULAR & CHEMICAL
1 NATURAL SCIENCES	UI	PHYSICS, MULTIDISCIPLINARY
1 NATURAL SCIENCES	UK	PHYSICS, CONDENSED MATTER
1 NATURAL SCIENCES	UN	PHYSICS, NUCLEAR
1 NATURAL SCIENCES	UP	PHYSICS, PARTICLES & FIELDS
1 NATURAL SCIENCES	DW	CHEMISTRY, APPLIED
1 NATURAL SCIENCES	DY	CHEMISTRY, MULTIDISCIPLINARY

1 NATURAL SCIENCES	EA	CHEMISTRY, ANALYTICAL
1 NATURAL SCIENCES	EC	CHEMISTRY, INORGANIC & NUCLEAR
1 NATURAL SCIENCES	EE	CHEMISTRY, ORGANIC
1 NATURAL SCIENCES	EI	CHEMISTRY, PHYSICAL
1 NATURAL SCIENCES	FI	CRYSTALLOGRAPHY
1 NATURAL SCIENCES	HQ	ELECTROCHEMISTRY
1 NATURAL SCIENCES	UY	POLYMER SCIENCE
1 NATURAL SCIENCES	GC	GEOCHEMISTRY & GEOPHYSICS
1 NATURAL SCIENCES	JA	ENVIRONMENTAL SCIENCES
1 NATURAL SCIENCES	KV	GEOGRAPHY, PHYSICAL
1 NATURAL SCIENCES	KY	GEOLOGY
1 NATURAL SCIENCES	LE	GEOSCIENCES, MULTIDISCIPLINARY
1 NATURAL SCIENCES	QQ	METEOROLOGY & ATMOSPHERIC SCIENCES
1 NATURAL SCIENCES	RE	MINERALOGY
1 NATURAL SCIENCES	SI	OCEANOGRAPHY
1 NATURAL SCIENCES	TE	PALEONTOLOGY
1 NATURAL SCIENCES	ZR	WATER RESOURCES
1 NATURAL SCIENCES	BD	BIODIVERSITY CONSERVATION
1 NATURAL SCIENCES	CO	BIOCHEMICAL RESEARCH METHODS
1 NATURAL SCIENCES	CQ	BIOCHEMISTRY & MOLECULAR BIOLOGY
1 NATURAL SCIENCES	CU	BIOLOGY
1 NATURAL SCIENCES	DA	BIOPHYSICS
1 NATURAL SCIENCES	DE	PLANT SCIENCES
1 NATURAL SCIENCES	DR	CELL BIOLOGY
1 NATURAL SCIENCES	GU	ECOLOGY
1 NATURAL SCIENCES	HT	EVOLUTIONARY BIOLOGY
1 NATURAL SCIENCES	HY	DEVELOPMENTAL BIOLOGY
1 NATURAL SCIENCES	IY	ENTOMOLOGY
1 NATURAL SCIENCES	KM	GENETICS & HEREDITY
1 NATURAL SCIENCES	MC	MATHEMATICAL & COMPUTATIONAL BIOLOGY
1 NATURAL SCIENCES	OU	LIMNOLOGY
1 NATURAL SCIENCES	PI	MARINE & FRESHWATER BIOLOGY
1 NATURAL SCIENCES	QU	MICROBIOLOGY
1 NATURAL SCIENCES	RQ	MYCOLOGY

1 NATURAL SCIENCES	TA	ORNITHOLOGY
1 NATURAL SCIENCES	WF	REPRODUCTIVE BIOLOGY
1 NATURAL SCIENCES	ZE	VIROLOGY
1 NATURAL SCIENCES	ZM	ZOOLOGY
1 NATURAL SCIENCES	RO	MULTIDISCIPLINARY SCIENCES
2 ENGINEERING AND TECHNOLOGY	FA	CONSTRUCTION & BUILDING TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	IM	ENGINEERING, CIVIL
2 ENGINEERING AND TECHNOLOGY	YR	TRANSPORTATION SCIENCE & TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	AC	AUTOMATION & CONTROL SYSTEMS
2 ENGINEERING AND TECHNOLOGY	ES	COMPUTER SCIENCE, HARDWARE & ARCHITECTURE
2 ENGINEERING AND TECHNOLOGY	IQ	ENGINEERING, ELECTRICAL & ELECTRONIC
2 ENGINEERING AND TECHNOLOGY	RB	ROBOTICS
2 ENGINEERING AND TECHNOLOGY	YE	TELECOMMUNICATIONS
2 ENGINEERING AND TECHNOLOGY	AI	ENGINEERING, AEROSPACE
2 ENGINEERING AND TECHNOLOGY	DT	THERMODYNAMICS
2 ENGINEERING AND TECHNOLOGY	IU	ENGINEERING, MECHANICAL
2 ENGINEERING AND TECHNOLOGY	PU	MECHANICS
2 ENGINEERING AND TECHNOLOGY	RY	NUCLEAR SCIENCE & TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	II	ENGINEERING, CHEMICAL
2 ENGINEERING AND TECHNOLOGY	PJ	MATERIALS SCIENCE, PAPER & WOOD
2 ENGINEERING AND TECHNOLOGY	PK	MATERIALS SCIENCE, CERAMICS
2 ENGINEERING AND TECHNOLOGY	PM	MATERIALS SCIENCE, MULTIDISCIPLINARY
2 ENGINEERING AND TECHNOLOGY	PZ	METALLURGY & METALLURGICAL ENGINEERING
2 ENGINEERING AND TECHNOLOGY	QF	MATERIALS SCIENCE, CHARACTERIZATION & TESTING
2 ENGINEERING AND TECHNOLOGY	QG	MATERIALS SCIENCE, COATINGS & FILMS
2 ENGINEERING AND TECHNOLOGY	QH	MATERIALS SCIENCE, COMPOSITES
2 ENGINEERING AND TECHNOLOGY	QJ	MATERIALS SCIENCE, TEXTILES
2 ENGINEERING AND TECHNOLOGY	IG	ENGINEERING, BIOMEDICAL
2 ENGINEERING AND TECHNOLOGY	PW	MEDICAL LABORATORY TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	CT	CELL & TISSUE ENGINEERING
2 ENGINEERING AND TECHNOLOGY	ID	ENERGY & FUELS
2 ENGINEERING AND TECHNOLOGY	IH	ENGINEERING, ENVIRONMENTAL
2 ENGINEERING AND TECHNOLOGY	IL	ENGINEERING, MARINE
2 ENGINEERING AND TECHNOLOGY	IO	ENGINEERING, OCEAN

2 ENGINEERING AND TECHNOLOGY	IP	ENGINEERING, PETROLEUM
2 ENGINEERING AND TECHNOLOGY	IX	ENGINEERING, GEOLOGICAL
2 ENGINEERING AND TECHNOLOGY	SR	REMOTE SENSING
2 ENGINEERING AND TECHNOLOGY	ZQ	MINING & MINERAL PROCESSING
2 ENGINEERING AND TECHNOLOGY	DB	BIOTECHNOLOGY & APPLIED MICROBIOLOGY
2 ENGINEERING AND TECHNOLOGY	QE	MATERIALS SCIENCE, BIOMATERIALS
2 ENGINEERING AND TECHNOLOGY	NS	NANOSCIENCE & NANOTECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	IF	ENGINEERING, MULTIDISCIPLINARY
2 ENGINEERING AND TECHNOLOGY	IJ	ENGINEERING, INDUSTRIAL
2 ENGINEERING AND TECHNOLOGY	IK	ENGINEERING, MANUFACTURING
2 ENGINEERING AND TECHNOLOGY	JY	FOOD SCIENCE & TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	OA	INSTRUMENTS & INSTRUMENTATION
2 ENGINEERING AND TECHNOLOGY	RA	MICROSCOPY
2 ENGINEERING AND TECHNOLOGY	UE	IMAGING SCIENCE & PHOTOGRAPHIC TECHNOLOGY
2 ENGINEERING AND TECHNOLOGY	XQ	SPECTROSCOPY
3 MEDICAL AND HEALTH SCIENCES	CL	AUDIOLOGY & SPEECH-LANGUAGE PATHOLOGY
3 MEDICAL AND HEALTH SCIENCES	AY	ANATOMY & MORPHOLOGY
3 MEDICAL AND HEALTH SCIENCES	DX	CHEMISTRY, MEDICINAL
3 MEDICAL AND HEALTH SCIENCES	EQ	PSYCHOLOGY, CLINICAL
3 MEDICAL AND HEALTH SCIENCES	NI	IMMUNOLOGY
3 MEDICAL AND HEALTH SCIENCES	QA	MEDICINE, RESEARCH & EXPERIMENTAL
3 MEDICAL AND HEALTH SCIENCES	RU	NEUROSCIENCES
3 MEDICAL AND HEALTH SCIENCES	TM	PATHOLOGY
3 MEDICAL AND HEALTH SCIENCES	TU	PHARMACOLOGY & PHARMACY
3 MEDICAL AND HEALTH SCIENCES	UM	PHYSIOLOGY
3 MEDICAL AND HEALTH SCIENCES	YO	TOXICOLOGY
3 MEDICAL AND HEALTH SCIENCES	AQ	ALLERGY
3 MEDICAL AND HEALTH SCIENCES	AZ	ANDROLOGY
3 MEDICAL AND HEALTH SCIENCES	BA	ANESTHESIOLOGY
3 MEDICAL AND HEALTH SCIENCES	DM	ONCOLOGY
3 MEDICAL AND HEALTH SCIENCES	DQ	CARDIAC & CARDIOVASCULAR SYSTEMS
3 MEDICAL AND HEALTH SCIENCES	DS	CRITICAL CARE MEDICINE
3 MEDICAL AND HEALTH SCIENCES	FF	EMERGENCY MEDICINE
3 MEDICAL AND HEALTH SCIENCES	FY	DENTISTRY, ORAL SURGERY & MEDICINE

3 MEDICAL AND HEALTH SCIENCES	GA	DERMATOLOGY
3 MEDICAL AND HEALTH SCIENCES	IA	ENDOCRINOLOGY & METABOLISM
3 MEDICAL AND HEALTH SCIENCES	KI	GASTROENTEROLOGY & HEPATOLOGY
3 MEDICAL AND HEALTH SCIENCES	LI	GERIATRICS & GERONTOLOGY
3 MEDICAL AND HEALTH SCIENCES	LJ	GERONTOLOGY
3 MEDICAL AND HEALTH SCIENCES	MA	HEMATOLOGY
3 MEDICAL AND HEALTH SCIENCES	OI	INTEGRATIVE & COMPLEMENTARY MEDICINE
3 MEDICAL AND HEALTH SCIENCES	PY	MEDICINE, GENERAL & INTERNAL
3 MEDICAL AND HEALTH SCIENCES	RT	CLINICAL NEUROLOGY
3 MEDICAL AND HEALTH SCIENCES	RX	NEUROIMAGING
3 MEDICAL AND HEALTH SCIENCES	SD	OBSTETRICS & GYNECOLOGY
3 MEDICAL AND HEALTH SCIENCES	SU	OPHTHALMOLOGY
3 MEDICAL AND HEALTH SCIENCES	TC	ORTHOPEDICS
3 MEDICAL AND HEALTH SCIENCES	TD	OTORHINOLARYNGOLOGY
3 MEDICAL AND HEALTH SCIENCES	TQ	PEDIATRICS
3 MEDICAL AND HEALTH SCIENCES	VE	PSYCHIATRY
3 MEDICAL AND HEALTH SCIENCES	VY	RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING
3 MEDICAL AND HEALTH SCIENCES	WE	RESPIRATORY SYSTEM
3 MEDICAL AND HEALTH SCIENCES	WH	RHEUMATOLOGY
3 MEDICAL AND HEALTH SCIENCES	YA	SURGERY
3 MEDICAL AND HEALTH SCIENCES	YP	TRANSPLANTATION
3 MEDICAL AND HEALTH SCIENCES	ZA	UROLOGY & NEPHROLOGY
3 MEDICAL AND HEALTH SCIENCES	ZD	PERIPHERAL VASCULAR DISEASE
3 MEDICAL AND HEALTH SCIENCES	GM	SUBSTANCE ABUSE
3 MEDICAL AND HEALTH SCIENCES	HL	HEALTH CARE SCIENCES & SERVICES
3 MEDICAL AND HEALTH SCIENCES	LQ	HEALTH POLICY & SERVICES
3 MEDICAL AND HEALTH SCIENCES	NE	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH
3 MEDICAL AND HEALTH SCIENCES	NN	INFECTIOUS DISEASES
3 MEDICAL AND HEALTH SCIENCES	OO	MEDICAL ETHICS
3 MEDICAL AND HEALTH SCIENCES	OP	MEDICINE, LEGAL
3 MEDICAL AND HEALTH SCIENCES	PT	MEDICAL INFORMATICS
3 MEDICAL AND HEALTH SCIENCES	RZ	NURSING
3 MEDICAL AND HEALTH SCIENCES	SA	NUTRITION & DIETETICS
3 MEDICAL AND HEALTH SCIENCES	TI	PARASITOLOGY

3 MEDICAL AND HEALTH SCIENCES	VP	PSYCHOLOGY, PSYCHOANALYSIS
3 MEDICAL AND HEALTH SCIENCES	WC	REHABILITATION
3 MEDICAL AND HEALTH SCIENCES	WV	SOCIAL SCIENCES, BIOMEDICAL
3 MEDICAL AND HEALTH SCIENCES	XW	SPORT SCIENCES
3 MEDICAL AND HEALTH SCIENCES	YU	TROPICAL MEDICINE
3 MEDICAL AND HEALTH SCIENCES	ML	PRIMARY HEALTH CARE
4 AGRICULTURAL SCIENCES	AH	AGRICULTURE, MULTIDISCIPLINARY
4 AGRICULTURAL SCIENCES	AM	AGRONOMY
4 AGRICULTURAL SCIENCES	JU	FISHERIES
4 AGRICULTURAL SCIENCES	KA	FORESTRY
4 AGRICULTURAL SCIENCES	MU	HORTICULTURE
4 AGRICULTURAL SCIENCES	XE	SOIL SCIENCE
4 AGRICULTURAL SCIENCES	AD	AGRICULTURE, DAIRY & ANIMAL SCIENCE
4 AGRICULTURAL SCIENCES	ZC	VETERINARY SCIENCES
4 AGRICULTURAL SCIENCES	AE	AGRICULTURAL ENGINEERING
4 AGRICULTURAL SCIENCES	AF	AGRICULTURAL ECONOMICS & POLICY
4 AGRICULTURAL SCIENCES	JY	FOOD SCIENCE & TECHNOLOGY
5 SOCIAL SCIENCES	BV	PSYCHOLOGY, BIOLOGICAL
5 SOCIAL SCIENCES	CN	BEHAVIORAL SCIENCES
5 SOCIAL SCIENCES	HI	PSYCHOLOGY, EDUCATIONAL
5 SOCIAL SCIENCES	JI	ERGONOMICS
5 SOCIAL SCIENCES	MY	PSYCHOLOGY, DEVELOPMENTAL
5 SOCIAL SCIENCES	NQ	PSYCHOLOGY, APPLIED
5 SOCIAL SCIENCES	VI	PSYCHOLOGY
5 SOCIAL SCIENCES	VJ	PSYCHOLOGY, MULTIDISCIPLINARY
5 SOCIAL SCIENCES	VS	PSYCHOLOGY, MATHEMATICAL
5 SOCIAL SCIENCES	VX	PSYCHOLOGY, EXPERIMENTAL
5 SOCIAL SCIENCES	WQ	PSYCHOLOGY, SOCIAL
5 SOCIAL SCIENCES	DI	BUSINESS
5 SOCIAL SCIENCES	DK	BUSINESS, FINANCE
5 SOCIAL SCIENCES	GY	ECONOMICS
5 SOCIAL SCIENCES	NM	INDUSTRIAL RELATIONS & LABOR
5 SOCIAL SCIENCES	PC	MANAGEMENT
5 SOCIAL SCIENCES	PE	OPERATIONS RESEARCH & MANAGEMENT SCIENCE

5 SOCIAL SCIENCES	HA	EDUCATION & EDUCATIONAL RESEARCH
5 SOCIAL SCIENCES	HB	EDUCATION, SCIENTIFIC DISCIPLINES
5 SOCIAL SCIENCES	HE	EDUCATION, SPECIAL
5 SOCIAL SCIENCES	BF	ANTHROPOLOGY
5 SOCIAL SCIENCES	FU	DEMOGRAPHY
5 SOCIAL SCIENCES	JM	ETHNIC STUDIES
5 SOCIAL SCIENCES	JO	FAMILY STUDIES
5 SOCIAL SCIENCES	PS	SOCIAL SCIENCES, MATHEMATICAL METHODS
5 SOCIAL SCIENCES	WM	SOCIAL ISSUES
5 SOCIAL SCIENCES	WY	SOCIAL WORK
5 SOCIAL SCIENCES	XA	SOCIOLOGY
5 SOCIAL SCIENCES	ZK	WOMEN'S STUDIES
5 SOCIAL SCIENCES	FE	CRIMINOLOGY & PENOLOGY
5 SOCIAL SCIENCES	OM	LAW
5 SOCIAL SCIENCES	OE	INTERNATIONAL RELATIONS
5 SOCIAL SCIENCES	UU	POLITICAL SCIENCE
5 SOCIAL SCIENCES	VM	PUBLIC ADMINISTRATION
5 SOCIAL SCIENCES	BM	AREA STUDIES
5 SOCIAL SCIENCES	JB	ENVIRONMENTAL STUDIES
5 SOCIAL SCIENCES	KU	GEOGRAPHY
5 SOCIAL SCIENCES	UQ	PLANNING & DEVELOPMENT
5 SOCIAL SCIENCES	YQ	TRANSPORTATION
5 SOCIAL SCIENCES	YY	URBAN STUDIES
5 SOCIAL SCIENCES	EU	COMMUNICATION
5 SOCIAL SCIENCES	NU	INFORMATION SCIENCE & LIBRARY SCIENCE
5 SOCIAL SCIENCES	MW	HOSPITALITY, LEISURE, SPORT & TOURISM
5 SOCIAL SCIENCES	OR	ASIAN STUDIES
5 SOCIAL SCIENCES	EN	CULTURAL STUDIES
5 SOCIAL SCIENCES	WU	SOCIAL SCIENCES, INTERDISCIPLINARY
6 HUMANITIES	BI	ARCHAEOLOGY
6 HUMANITIES	MM	HISTORY
6 HUMANITIES	MQ	HISTORY & PHILOSOPHY OF SCIENCE
6 HUMANITIES	MR	HISTORY OF SOCIAL SCIENCES
6 HUMANITIES	QK	MEDIEVAL & RENAISSANCE STUDIES

6 HUMANITIES	EO	CLASSICS
6 HUMANITIES	JW	FOLKLORE
6 HUMANITIES	OT	LINGUISTICS
6 HUMANITIES	OX	LITERARY THEORY & CRITICISM
6 HUMANITIES	OY	LANGUAGE & LINGUISTICS
6 HUMANITIES	OZ	LITERARY REVIEWS
6 HUMANITIES	PA	LITERATURE
6 HUMANITIES	PD	LITERATURE, AFRICAN, AUSTRALIAN, CANADIAN
6 HUMANITIES	PF	LITERATURE, AMERICAN
6 HUMANITIES	PG	LITERATURE, BRITISH ISLES
6 HUMANITIES	PH	LITERATURE, GERMAN, DUTCH, SCANDINAVIAN
6 HUMANITIES	QC	LITERATURE, ROMANCE
6 HUMANITIES	QD	LITERATURE, SLAVIC
6 HUMANITIES	UT	POETRY
6 HUMANITIES	HF	ETHICS
6 HUMANITIES	UA	PHILOSOPHY
6 HUMANITIES	YI	RELIGION
6 HUMANITIES	BK	ARCHITECTURE
6 HUMANITIES	BP	ART
6 HUMANITIES	FS	DANCE
6 HUMANITIES	JS	FILM, RADIO, TELEVISION
6 HUMANITIES	RP	MUSIC
6 HUMANITIES	YG	THEATER
6 HUMANITIES	BQ	HUMANITIES, MULTIDISCIPLINARY
1.01 Mathematics	PN	MATHEMATICS, APPLIED
1.01 Mathematics	PO	MATHEMATICS, INTERDISCIPLINARY APPLICATIONS
1.01 Mathematics	PQ	MATHEMATICS
1.01 Mathematics	UR	PHYSICS, MATHEMATICAL
1.01 Mathematics	QL	LOGIC
1.01 Mathematics	XY	STATISTICS & PROBABILITY
1.02 Computer and information sciences	QL	LOGIC
1.02 Computer and information sciences	EP	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE
1.02 Computer and information sciences	ER	COMPUTER SCIENCE, CYBERNETICS
1.02 Computer and information sciences	ET	COMPUTER SCIENCE, INFORMATION SYSTEMS

1.02 Computer and information sciences	EV	COMPUTER SCIENCE, INTERDISCIPLINARY APPLICATIONS
1.02 Computer and information sciences	EW	COMPUTER SCIENCE, SOFTWARE ENGINEERING
1.02 Computer and information sciences	EX	COMPUTER SCIENCE, THEORY & METHODS
1.03 Physical sciences and astronomy	AA	ACOUSTICS
1.03 Physical sciences and astronomy	BU	ASTRONOMY & ASTROPHYSICS
1.03 Physical sciences and astronomy	SY	OPTICS
1.03 Physical sciences and astronomy	UB	PHYSICS, APPLIED
1.03 Physical sciences and astronomy	UF	PHYSICS, FLUIDS & PLASMAS
1.03 Physical sciences and astronomy	UH	PHYSICS, ATOMIC, MOLECULAR & CHEMICAL
1.03 Physical sciences and astronomy	UI	PHYSICS, MULTIDISCIPLINARY
1.03 Physical sciences and astronomy	UK	PHYSICS, CONDENSED MATTER
1.03 Physical sciences and astronomy	UN	PHYSICS, NUCLEAR
1.03 Physical sciences and astronomy	UP	PHYSICS, PARTICLES & FIELDS
1.04 Chemical sciences	DW	CHEMISTRY, APPLIED
1.04 Chemical sciences	DY	CHEMISTRY, MULTIDISCIPLINARY
1.04 Chemical sciences	EA	CHEMISTRY, ANALYTICAL
1.04 Chemical sciences	EC	CHEMISTRY, INORGANIC & NUCLEAR
1.04 Chemical sciences	EE	CHEMISTRY, ORGANIC
1.04 Chemical sciences	EI	CHEMISTRY, PHYSICAL
1.04 Chemical sciences	FI	CRYSTALLOGRAPHY
1.04 Chemical sciences	HQ	ELECTROCHEMISTRY
1.04 Chemical sciences	UY	POLYMER SCIENCE
1.05 Earth and related environmental sciences	GC	GEOCHEMISTRY & GEOPHYSICS
1.05 Earth and related environmental sciences	JA	ENVIRONMENTAL SCIENCES
1.05 Earth and related environmental sciences	KV	GEOGRAPHY, PHYSICAL
1.05 Earth and related environmental sciences	KY	GEOLOGY
1.05 Earth and related environmental sciences	LE	GEOSCIENCES, MULTIDISCIPLINARY
1.05 Earth and related environmental sciences	QQ	METEOROLOGY & ATMOSPHERIC SCIENCES
1.05 Earth and related environmental sciences	RE	MINERALOGY
1.05 Earth and related environmental sciences	SI	OCEANOGRAPHY
1.05 Earth and related environmental sciences	TE	PALEONTOLOGY
1.05 Earth and related environmental sciences	ZR	WATER RESOURCES
1.06 Biological sciences	BD	BIODIVERSITY CONSERVATION
1.06 Biological sciences	CO	BIOCHEMICAL RESEARCH METHODS

1.06 Biological sciences	CQ	BIOCHEMISTRY & MOLECULAR BIOLOGY
1.06 Biological sciences	CU	BIOLOGY
1.06 Biological sciences	DA	BIOPHYSICS
1.06 Biological sciences	DE	PLANT SCIENCES
1.06 Biological sciences	DR	CELL BIOLOGY
1.06 Biological sciences	GU	ECOLOGY
1.06 Biological sciences	HT	EVOLUTIONARY BIOLOGY
1.06 Biological sciences	HY	DEVELOPMENTAL BIOLOGY
1.06 Biological sciences	IY	ENTOMOLOGY
1.06 Biological sciences	KM	GENETICS & HEREDITY
1.06 Biological sciences	MC	MATHEMATICAL & COMPUTATIONAL BIOLOGY
1.06 Biological sciences	OU	LIMNOLOGY
1.06 Biological sciences	PI	MARINE & FRESHWATER BIOLOGY
1.06 Biological sciences	QU	MICROBIOLOGY
1.06 Biological sciences	RQ	MYCOLOGY
1.06 Biological sciences	TA	ORNITHOLOGY
1.06 Biological sciences	WF	REPRODUCTIVE BIOLOGY
1.06 Biological sciences	ZE	VIROLOGY
1.06 Biological sciences	ZM	ZOOLOGY
1.07 Other natural sciences	RO	MULTIDISCIPLINARY SCIENCES
2.01 Civil engineering	FA	CONSTRUCTION & BUILDING TECHNOLOGY
2.01 Civil engineering	IM	ENGINEERING, CIVIL
2.01 Civil engineering	YR	TRANSPORTATION SCIENCE & TECHNOLOGY
2.02 Electrical eng, electronic eng	AC	AUTOMATION & CONTROL SYSTEMS
2.02 Electrical eng, electronic eng	ES	COMPUTER SCIENCE, HARDWARE & ARCHITECTURE
2.02 Electrical eng, electronic eng	IQ	ENGINEERING, ELECTRICAL & ELECTRONIC
2.02 Electrical eng, electronic eng	RB	ROBOTICS
2.02 Electrical eng, electronic eng	YE	TELECOMMUNICATIONS
2.03 Mechanical engineering	AI	ENGINEERING, AEROSPACE
2.03 Mechanical engineering	DT	THERMODYNAMICS
2.03 Mechanical engineering	IU	ENGINEERING, MECHANICAL
2.03 Mechanical engineering	PU	MECHANICS
2.03 Mechanical engineering	RY	NUCLEAR SCIENCE & TECHNOLOGY
2.04 Chemical engineering	II	ENGINEERING, CHEMICAL

2.05 Materials engineering	PJ	MATERIALS SCIENCE, PAPER & WOOD
2.05 Materials engineering	PK	MATERIALS SCIENCE, CERAMICS
2.05 Materials engineering	PM	MATERIALS SCIENCE, MULTIDISCIPLINARY
2.05 Materials engineering	PZ	METALLURGY & METALLURGICAL ENGINEERING
2.05 Materials engineering	QF	MATERIALS SCIENCE, CHARACTERIZATION & TESTING
2.05 Materials engineering	QG	MATERIALS SCIENCE, COATINGS & FILMS
2.05 Materials engineering	QH	MATERIALS SCIENCE, COMPOSITES
2.05 Materials engineering	QJ	MATERIALS SCIENCE, TEXTILES
2.06 Medical engineering	IG	ENGINEERING, BIOMEDICAL
2.06 Medical engineering	PW	MEDICAL LABORATORY TECHNOLOGY
2.06 Medical engineering	CT	CELL & TISSUE ENGINEERING
2.07 Environmental engineering	ID	ENERGY & FUELS
2.07 Environmental engineering	IH	ENGINEERING, ENVIRONMENTAL
2.07 Environmental engineering	IL	ENGINEERING, MARINE
2.07 Environmental engineering	IO	ENGINEERING, OCEAN
2.07 Environmental engineering	IP	ENGINEERING, PETROLEUM
2.07 Environmental engineering	IX	ENGINEERING, GEOLOGICAL
2.07 Environmental engineering	SR	REMOTE SENSING
2.07 Environmental engineering	ZQ	MINING & MINERAL PROCESSING
2.08 Environmental biotechnology	DB	BIOTECHNOLOGY & APPLIED MICROBIOLOGY
2.09 Industrial biotechnology	QE	MATERIALS SCIENCE, BIOMATERIALS
2.1 Nano-technology	NS	NANOSCIENCE & NANOTECHNOLOGY
2.11 Other engineering and technologies	IF	ENGINEERING, MULTIDISCIPLINARY
2.11 Other engineering and technologies	IJ	ENGINEERING, INDUSTRIAL
2.11 Other engineering and technologies	IK	ENGINEERING, MANUFACTURING
2.11 Other engineering and technologies	JY	FOOD SCIENCE & TECHNOLOGY
2.11 Other engineering and technologies	OA	INSTRUMENTS & INSTRUMENTATION
2.11 Other engineering and technologies	RA	MICROSCOPY
2.11 Other engineering and technologies	UE	IMAGING SCIENCE & PHOTOGRAPHIC TECHNOLOGY
2.11 Other engineering and technologies	XQ	SPECTROSCOPY
3.01 Basic medical research	AY	ANATOMY & MORPHOLOGY
3.01 Basic medical research	DX	CHEMISTRY, MEDICINAL
3.01 Basic medical research	EQ	PSYCHOLOGY, CLINICAL
3.01 Basic medical research	NI	IMMUNOLOGY

3.01 Basic medical research	QA	MEDICINE, RESEARCH & EXPERIMENTAL
3.01 Basic medical research	RU	NEUROSCIENCES
3.01 Basic medical research	TM	PATHOLOGY
3.01 Basic medical research	TU	PHARMACOLOGY & PHARMACY
3.01 Basic medical research	UM	PHYSIOLOGY
3.01 Basic medical research	YO	TOXICOLOGY
3.02 Clinical medicine	AQ	ALLERGY
3.02 Clinical medicine	AZ	ANDROLOGY
3.02 Clinical medicine	BA	ANESTHESIOLOGY
3.02 Clinical medicine	DM	ONCOLOGY
3.02 Clinical medicine	DQ	CARDIAC & CARDIOVASCULAR SYSTEMS
3.02 Clinical medicine	DS	CRITICAL CARE MEDICINE
3.02 Clinical medicine	FF	EMERGENCY MEDICINE
3.02 Clinical medicine	FY	DENTISTRY, ORAL SURGERY & MEDICINE
3.02 Clinical medicine	GA	DERMATOLOGY
3.02 Clinical medicine	IA	ENDOCRINOLOGY & METABOLISM
3.02 Clinical medicine	KI	GASTROENTEROLOGY & HEPATOLOGY
3.02 Clinical medicine	LI	GERIATRICS & GERONTOLOGY
3.02 Clinical medicine	LJ	GERONTOLOGY
3.02 Clinical medicine	MA	HEMATOLOGY
3.02 Clinical medicine	OI	INTEGRATIVE & COMPLEMENTARY MEDICINE
3.02 Clinical medicine	PY	MEDICINE, GENERAL & INTERNAL
3.02 Clinical medicine	RT	CLINICAL NEUROLOGY
3.02 Clinical medicine	RX	NEUROIMAGING
3.02 Clinical medicine	SD	OBSTETRICS & GYNECOLOGY
3.02 Clinical medicine	SU	OPHTHALMOLOGY
3.02 Clinical medicine	TC	ORTHOPEDICS
3.02 Clinical medicine	TD	OTORHINOLARYNGOLOGY
3.02 Clinical medicine	TQ	PEDIATRICS
3.02 Clinical medicine	VE	PSYCHIATRY
3.02 Clinical medicine	VY	RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING
3.02 Clinical medicine	WE	RESPIRATORY SYSTEM
3.02 Clinical medicine	WH	RHEUMATOLOGY
3.02 Clinical medicine	YA	SURGERY

3.02 Clinical medicine	YP	TRANSPLANTATION
3.02 Clinical medicine	ZA	UROLOGY & NEPHROLOGY
3.02 Clinical medicine	ZD	PERIPHERAL VASCULAR DISEASE
3.02 Clinical medicine	CL	AUDIOLOGY & SPEECH-LANGUAGE PATHOLOGY
3.03 Health sciences	GM	SUBSTANCE ABUSE
3.03 Health sciences	HL	HEALTH CARE SCIENCES & SERVICES
3.03 Health sciences	LQ	HEALTH POLICY & SERVICES
3.03 Health sciences	NE	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH
3.03 Health sciences	NN	INFECTIOUS DISEASES
3.03 Health sciences	OO	MEDICAL ETHICS
3.03 Health sciences	OP	MEDICINE, LEGAL
3.03 Health sciences	PT	MEDICAL INFORMATICS
3.03 Health sciences	RZ	NURSING
3.03 Health sciences	SA	NUTRITION & DIETETICS
3.03 Health sciences	TI	PARASITOLOGY
3.03 Health sciences	VP	PSYCHOLOGY, PSYCHOANALYSIS
3.03 Health sciences	WC	REHABILITATION
3.03 Health sciences	WV	SOCIAL SCIENCES, BIOMEDICAL
3.03 Health sciences	XW	SPORT SCIENCES
3.03 Health sciences	YU	TROPICAL MEDICINE
3.03 Health sciences	ML	PRIMARY HEALTH CARE
4.01 Agriculture, forestry, fisheries	AH	AGRICULTURE, MULTIDISCIPLINARY
4.01 Agriculture, forestry, fisheries	AM	AGRONOMY
4.01 Agriculture, forestry, fisheries	JU	FISHERIES
4.01 Agriculture, forestry, fisheries	KA	FORESTRY
4.01 Agriculture, forestry, fisheries	MU	HORTICULTURE
4.01 Agriculture, forestry, fisheries	XE	SOIL SCIENCE
4.02 Animal and dairy science	AD	AGRICULTURE, DAIRY & ANIMAL SCIENCE
4.03 Veterinary science	ZC	VETERINARY SCIENCES
4.05 Other agricultural science	AE	AGRICULTURAL ENGINEERING
4.05 Other agricultural science	AF	AGRICULTURAL ECONOMICS & POLICY
4.05 Other agricultural science	JY	FOOD SCIENCE & TECHNOLOGY
5.01 Psychology	BV	PSYCHOLOGY, BIOLOGICAL
5.01 Psychology	CN	BEHAVIORAL SCIENCES

5.01 Psychology	HI	PSYCHOLOGY, EDUCATIONAL
5.01 Psychology	JI	ERGONOMICS
5.01 Psychology	MY	PSYCHOLOGY, DEVELOPMENTAL
5.01 Psychology	NQ	PSYCHOLOGY, APPLIED
5.01 Psychology	VI	PSYCHOLOGY
5.01 Psychology	VJ	PSYCHOLOGY, MULTIDISCIPLINARY
5.01 Psychology	VS	PSYCHOLOGY, MATHEMATICAL
5.01 Psychology	VX	PSYCHOLOGY, EXPERIMENTAL
5.01 Psychology	WQ	PSYCHOLOGY, SOCIAL
5.02 Economics and business	DI	BUSINESS
5.02 Economics and business	DK	BUSINESS, FINANCE
5.02 Economics and business	GY	ECONOMICS
5.02 Economics and business	NM	INDUSTRIAL RELATIONS & LABOR
5.02 Economics and business	PC	MANAGEMENT
5.02 Economics and business	PE	OPERATIONS RESEARCH & MANAGEMENT SCIENCE
5.03 Educational sciences	HA	EDUCATION & EDUCATIONAL RESEARCH
5.03 Educational sciences	HB	EDUCATION, SCIENTIFIC DISCIPLINES
5.03 Educational sciences	HE	EDUCATION, SPECIAL
5.04 Sociology	BF	ANTHROPOLOGY
5.04 Sociology	FU	DEMOGRAPHY
5.04 Sociology	JM	ETHNIC STUDIES
5.04 Sociology	JO	FAMILY STUDIES
5.04 Sociology	PS	SOCIAL SCIENCES, MATHEMATICAL METHODS
5.04 Sociology	WM	SOCIAL ISSUES
5.04 Sociology	WY	SOCIAL WORK
5.04 Sociology	XA	SOCIOLOGY
5.04 Sociology	ZK	WOMEN'S STUDIES
5.05 Law	FE	CRIMINOLOGY & PENOLOGY
5.05 Law	OM	LAW
5.06 Political science	OE	INTERNATIONAL RELATIONS
5.06 Political science	UU	POLITICAL SCIENCE
5.06 Political science	VM	PUBLIC ADMINISTRATION
5.07 Social and economic geography	BM	AREA STUDIES
5.07 Social and economic geography	JB	ENVIRONMENTAL STUDIES

5.07 Social and economic geography	KU	GEOGRAPHY
5.07 Social and economic geography	UQ	PLANNING & DEVELOPMENT
5.07 Social and economic geography	YQ	TRANSPORTATION
5.07 Social and economic geography	YY	URBAN STUDIES
5.08 Media and communication	EU	COMMUNICATION
5.08 Media and communication	NU	INFORMATION SCIENCE & LIBRARY SCIENCE
5.09 Other social sciences	MW	HOSPITALITY, LEISURE, SPORT & TOURISM
5.09 Other social sciences	OR	ASIAN STUDIES
5.09 Other social sciences	EN	CULTURAL STUDIES
5.09 Other social sciences	WU	SOCIAL SCIENCES, INTERDISCIPLINARY
6.01 History and archaeology	BI	ARCHAEOLOGY
6.01 History and archaeology	MM	HISTORY
6.01 History and archaeology	MQ	HISTORY & PHILOSOPHY OF SCIENCE
6.01 History and archaeology	MR	HISTORY OF SOCIAL SCIENCES
6.01 History and archaeology	QK	MEDIEVAL & RENAISSANCE STUDIES
6.02 Languages and literature	EO	CLASSICS
6.02 Languages and literature	JW	FOLKLORE
6.02 Languages and literature	OT	LINGUISTICS
6.02 Languages and literature	OX	LITERARY THEORY & CRITICISM
6.02 Languages and literature	OY	LANGUAGE & LINGUISTICS
6.02 Languages and literature	OZ	LITERARY REVIEWS
6.02 Languages and literature	PA	LITERATURE
6.02 Languages and literature	PD	LITERATURE, AFRICAN, AUSTRALIAN, CANADIAN
6.02 Languages and literature	PF	LITERATURE, AMERICAN
6.02 Languages and literature	PG	LITERATURE, BRITISH ISLES
6.02 Languages and literature	PH	LITERATURE, GERMAN, DUTCH, SCANDINAVIAN
6.02 Languages and literature	QC	LITERATURE, ROMANCE
6.02 Languages and literature	QD	LITERATURE, SLAVIC
6.02 Languages and literature	UT	POETRY
6.03 Philosophy, ethics and religion	HF	ETHICS
6.03 Philosophy, ethics and religion	UA	PHILOSOPHY
6.03 Philosophy, ethics and religion	YI	RELIGION
6.04 Art	BK	ARCHITECTURE
6.04 Art	BP	ART

6.04 Art	FS	DANCE
6.04 Art	JS	FILM, RADIO, TELEVISION
6.04 Art	RP	MUSIC
6.04 Art	YG	THEATER
6.05 Other Humanities	BQ	HUMANITIES, MULTIDISCIPLINARY

APPENDIX VII – ELSEVIER TAXONOMY SCHEME

All Subject Areas	Related Subject Areas	Related Subject sub-Areas
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Agricultural Chemistry
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Agricultural Engineering and Technology
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Agricultural and Natural Resource Economics (General)
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Agriculture
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Agriculture and Environment
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Computational Biology
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Life Sciences (General)
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Mathematical Biosciences
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Mycology
Agricultural and Biological Sciences	Agricultural and Biological Sciences (General)	Theoretical Biology
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Biotechnology
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Climatology and Meteorology
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Computer and Electronic Systems
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Development
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Economics and Policy
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Legislation
Agricultural and Biological Sciences	Agronomy and Crop Science	Agricultural Machinery
Agricultural and Biological Sciences	Agronomy and Crop Science	Agriculture (General)
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Breeding and Genetics
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Diseases and Phytopathology
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Ecology
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Genetics Resources and Evolution
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Microbiology
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Nutrients and Nutrition
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Pests and Pest Control
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Physiology and Biochemistry
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop Protection
Agricultural and Biological Sciences	Agronomy and Crop Science	Crop, Soil and Water Interaction
Agricultural and Biological Sciences	Agronomy and Crop Science	Crops and Cropping Systems
Agricultural and Biological Sciences	Agronomy and Crop Science	Energy in Agriculture
Agricultural and Biological Sciences	Agronomy and Crop Science	Farm Management
Agricultural and Biological Sciences	Agronomy and Crop Science	Farm Mechanisation

Agricultural and Biological Sciences	Agronomy and Crop Science	Field Crops
Agricultural and Biological Sciences	Agronomy and Crop Science	Industrial Crops
Agricultural and Biological Sciences	Agronomy and Crop Science	Information Technology in Agriculture
Agricultural and Biological Sciences	Agronomy and Crop Science	Irrigation and Drainage
Agricultural and Biological Sciences	Agronomy and Crop Science	Postharvest Biology and Technology
Agricultural and Biological Sciences	Agronomy and Crop Science	Precision Agriculture
Agricultural and Biological Sciences	Agronomy and Crop Science	Processing of Agricultural Products
Agricultural and Biological Sciences	Agronomy and Crop Science	Seed Physiology, Production and Technology
Agricultural and Biological Sciences	Agronomy and Crop Science	Temperate Crops
Agricultural and Biological Sciences	Agronomy and Crop Science	Tropical Crops
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Behaviour and Welfare
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Biochemistry, Physiology and Endocrinology
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Ecology
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Feed Science
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Genetics and Breeding
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Molecular Biology
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Nutrition
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Production Systems
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Reproduction
Agricultural and Biological Sciences	Animal Science and Zoology	Animal Science
Agricultural and Biological Sciences	Aquatic Science	Aquacultural Engineering
Agricultural and Biological Sciences	Aquatic Science	Aquaculture
Agricultural and Biological Sciences	Aquatic Science	Aquaculture (Animals)
Agricultural and Biological Sciences	Aquatic Science	Aquaculture (Plants)
Agricultural and Biological Sciences	Aquatic Science	Aquatic Biology and Ecology
Agricultural and Biological Sciences	Aquatic Science	Aquatic Botany
Agricultural and Biological Sciences	Aquatic Science	Aquatic Toxicology
Agricultural and Biological Sciences	Aquatic Science	Fisheries Ecology
Agricultural and Biological Sciences	Aquatic Science	Fisheries Economics and Management
Agricultural and Biological Sciences	Aquatic Science	Fisheries Science
Agricultural and Biological Sciences	Aquatic Science	Fisheries Technology
Agricultural and Biological Sciences	Aquatic Science	Freshwater Biology and Ecology
Agricultural and Biological Sciences	Aquatic Science	Limnology
Agricultural and Biological Sciences	Aquatic Science	Marine Biology and Ecology
Agricultural and Biological Sciences	Aquatic Science	Marine Data and Modelling
Agricultural and Biological Sciences	Aquatic Science	Marine Science and Technology
Agricultural and Biological Sciences	Food Science	Bakery Products and Baking Technology
Agricultural and Biological Sciences	Food Science	Beverages: Alcoholic and Non-Alcoholic
Agricultural and Biological Sciences	Food Science	Carbohydrates
Agricultural and Biological Sciences	Food Science	Cereals and Cereal Products
Agricultural and Biological Sciences	Food Science	Chemical Analysis of Food
Agricultural and Biological Sciences	Food Science	Confectionary

Agricultural and Biological Sciences	Food Science	Egg and Egg Products
Agricultural and Biological Sciences	Food Science	Enzyme and Fermentation Technology
Agricultural and Biological Sciences	Food Science	Fats and Oils
Agricultural and Biological Sciences	Food Science	Fish, Seafood and Marine Products
Agricultural and Biological Sciences	Food Science	Flavour Chemistry
Agricultural and Biological Sciences	Food Science	Food Additives
Agricultural and Biological Sciences	Food Science	Food Biotechnology
Agricultural and Biological Sciences	Food Science	Food Chemistry
Agricultural and Biological Sciences	Food Science	Food Composition
Agricultural and Biological Sciences	Food Science	Food Contamination, Hygiene and Toxicology
Agricultural and Biological Sciences	Food Science	Food Economics and Statistics
Agricultural and Biological Sciences	Food Science	Food Engineering
Agricultural and Biological Sciences	Food Science	Food Marketing and Management
Agricultural and Biological Sciences	Food Science	Food Microbiology
Agricultural and Biological Sciences	Food Science	Food Packaging
Agricultural and Biological Sciences	Food Science	Food Physics
Agricultural and Biological Sciences	Food Science	Food Policy
Agricultural and Biological Sciences	Food Science	Food Preservation Methods and Development
Agricultural and Biological Sciences	Food Science	Food Preservation, Packaging and Storage
Agricultural and Biological Sciences	Food Science	Food Processing
Agricultural and Biological Sciences	Food Science	Food Processing Equipment
Agricultural and Biological Sciences	Food Science	Food Processing Technology
Agricultural and Biological Sciences	Food Science	Food Properties
Agricultural and Biological Sciences	Food Science	Food Safety
Agricultural and Biological Sciences	Food Science	Food Security
Agricultural and Biological Sciences	Food Science	Food Sensors and Biosensors
Agricultural and Biological Sciences	Food Science	Food Sensory Science
Agricultural and Biological Sciences	Food Science	Food Standards, Laws and Regulations
Agricultural and Biological Sciences	Food Science	Food and Health
Agricultural and Biological Sciences	Food Science	Foods, Ingredients and Additives
Agricultural and Biological Sciences	Food Science	Fruits, Vegetables and Nuts
Agricultural and Biological Sciences	Food Science	Genetic Engineering of Foods, Novel Foods
Agricultural and Biological Sciences	Food Science	Gums, Gels and Gelling Agents
Agricultural and Biological Sciences	Food Science	Herbs and Spices
Agricultural and Biological Sciences	Food Science	Macromolecule Functionality
Agricultural and Biological Sciences	Food Science	Meat, Poultry and Game
Agricultural and Biological Sciences	Food Science	Milk and Dairy Products

Agricultural and Biological Sciences	Food Science	Nutraceuticals, Functional and Medical Foods
Agricultural and Biological Sciences	Food Science	Nutrition
Agricultural and Biological Sciences	Food Science	Postharvest Storage
Agricultural and Biological Sciences	Food Science	Refrigerated and Frozen Foods
Agricultural and Biological Sciences	Food Science	Sensory Analysis and Consumer Sensory Analysis Research / Acceptability
Agricultural and Biological Sciences	Food Science	Sensory Evaluation and Organoleptic Properties
Agricultural and Biological Sciences	Food Science	Sugar, Syrups and Sweeteners
Agricultural and Biological Sciences	Forestry	Agroforestry
Agricultural and Biological Sciences	Forestry	Forest Ecology
Agricultural and Biological Sciences	Forestry	Forest Management
Agricultural and Biological Sciences	Forestry	Forest Production
Agricultural and Biological Sciences	Forestry	Forest Products (Wood and Wood-Based Materials)
Agricultural and Biological Sciences	Forestry	Forest Science
Agricultural and Biological Sciences	Forestry	Forestry Breeding and Genetics
Agricultural and Biological Sciences	Forestry	Processing of Forestry Products
Agricultural and Biological Sciences	Forestry	Silviculture
Agricultural and Biological Sciences	Forestry	Tree Physiology
Agricultural and Biological Sciences	Insect Science	Agricultural Entomology
Agricultural and Biological Sciences	Insect Science	Entomology
Agricultural and Biological Sciences	Insect Science	Insect Biochemistry
Agricultural and Biological Sciences	Insect Science	Insect Development
Agricultural and Biological Sciences	Insect Science	Insect Ecology and Behaviour
Agricultural and Biological Sciences	Insect Science	Insect Genetics
Agricultural and Biological Sciences	Insect Science	Insect Molecular Biology
Agricultural and Biological Sciences	Insect Science	Insect Morphology and Structure
Agricultural and Biological Sciences	Insect Science	Insect Physiology
Agricultural and Biological Sciences	Insect Science	Medical and Veterinary Entomology
Agricultural and Biological Sciences	Insect Science	Systematic Entomology
Agricultural and Biological Sciences	Plant Science	Arboriculture
Agricultural and Biological Sciences	Plant Science	Environmental Botany
Agricultural and Biological Sciences	Plant Science	Ethnobotany
Agricultural and Biological Sciences	Plant Science	Palaeobotany
Agricultural and Biological Sciences	Plant Science	Photosynthesis Research
Agricultural and Biological Sciences	Plant Science	Phytochemistry
Agricultural and Biological Sciences	Plant Science	Plant Breeding
Agricultural and Biological Sciences	Plant Science	Plant Cell Biology

Agricultural and Biological Sciences	Plant Science	Plant Development
Agricultural and Biological Sciences	Plant Science	Plant Ecology
Agricultural and Biological Sciences	Plant Science	Plant Genetics
Agricultural and Biological Sciences	Plant Science	Plant Molecular Biology
Agricultural and Biological Sciences	Plant Science	Plant Morphology and Structure
Agricultural and Biological Sciences	Plant Science	Plant Pathology
Agricultural and Biological Sciences	Plant Science	Plant Physiology and Biochemistry
Agricultural and Biological Sciences	Plant Science	Plant Reproduction
Agricultural and Biological Sciences	Plant Science	Plant Taxonomy and Systematics
Agricultural and Biological Sciences	Plant Science	Plant Virology
Agricultural and Biological Sciences	Plant Science	Range and Pasture Grasslands
Agricultural and Biological Sciences	Plant Science	Weeds and Weed Control
Agricultural and Biological Sciences	Soil Science	Environmental Quality of Soils
Agricultural and Biological Sciences	Soil Science	Groundwater Chemistry / Contaminant Hydrology
Agricultural and Biological Sciences	Soil Science	Soil Biochemistry
Agricultural and Biological Sciences	Soil Science	Soil Biology
Agricultural and Biological Sciences	Soil Science	Soil Ecology
Agricultural and Biological Sciences	Soil Science	Soil Erosion and Conservation
Agricultural and Biological Sciences	Soil Science	Soil Fertility and Plant Nutrition
Agricultural and Biological Sciences	Soil Science	Soil Microbiology
Agricultural and Biological Sciences	Soil Science	Soil Pollution
Agricultural and Biological Sciences	Soil Science	Soil Remediation
Agricultural and Biological Sciences	Soil Science	Soil Zoology
Agricultural and Biological Sciences	Soil Science	Soils
Agricultural and Biological Sciences	Soil Science	Soils Chemistry, Physics and Mineralogy
Agricultural and Biological Sciences	Soil Science	Soils and Environment
Agricultural and Biological Sciences	Soil Science	Structural Soil Science
Agricultural and Biological Sciences	Soil Science	Terramechanics
Agricultural and Biological Sciences	Soil Science	Wetland Soils

Biochemistry, Genetics and Molecular Biology	**Biochemistry**	**Biochemistry / Biophysics**
Biochemistry, Genetics and Molecular Biology	Biochemistry	Carbohydrate Biochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry	Comparative Biochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry	Enzymology
Biochemistry, Genetics and Molecular Biology	Biochemistry	Free Radicals
Biochemistry, Genetics and Molecular Biology	Biochemistry	Histochemistry, Cytochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry	Inorganic Biochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry	Lipids and Lipid Metabolism
Biochemistry, Genetics and Molecular Biology	Biochemistry	Methodology, Techniques and Instruments in Biochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry	Physical Biochemistry
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Bioenergetics
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Biological Transport
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Biomembranes
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	General Microscopy
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Molecular Epidemiology
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Molecular Evolution
Biochemistry, Genetics and Molecular Biology	Biochemistry, Genetics and Molecular Biology (General)	Protein Structure and Synthesis
Biochemistry, Genetics and Molecular Biology	Biotechnology	Bio and Phyto Remediation
Biochemistry, Genetics and Molecular Biology	Biotechnology	Bioengineering and Manufacturing
Biochemistry, Genetics and Molecular Biology	Biotechnology	Bioinformatics and Computational Biology
Biochemistry, Genetics and Molecular Biology	Biotechnology	Biomolecular Engineering
Biochemistry, Genetics and Molecular Biology	Biotechnology	Biosensors
Biochemistry, Genetics and Molecular Biology	Biotechnology	Biotechnology (General)
Biochemistry, Genetics and Molecular Biology	Biotechnology	Biotechnology in Health Care
Biochemistry, Genetics and Molecular Biology	Biotechnology	Environmental Biotechnology
Biochemistry, Genetics and Molecular Biology	Biotechnology	Medical Biomaterials
Biochemistry, Genetics and Molecular Biology	Cancer Research	Carcinogenesis
Biochemistry, Genetics and Molecular Biology	Cell Biology	Cellular Biology
Biochemistry, Genetics and Molecular Biology	Endocrinology	Bone Biology
Biochemistry, Genetics and Molecular Biology	Endocrinology	Calcium Metabolism
Biochemistry, Genetics and Molecular Biology	Endocrinology	Clinical Endocrinology
Biochemistry, Genetics and Molecular Biology	Endocrinology	Diabetes
Biochemistry, Genetics and Molecular Biology	Endocrinology	Pancreatology
Biochemistry, Genetics and Molecular Biology	Genetics	Applications of Molecular Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Comparative Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Cytogenetics
Biochemistry, Genetics and Molecular Biology	Genetics	DNA Repair
Biochemistry, Genetics and Molecular Biology	Genetics	Developmental Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Gene Structure Expression and Regulation
Biochemistry, Genetics and Molecular Biology	Genetics	Gene Therapy
Biochemistry, Genetics and Molecular Biology	Genetics	Genome Research
Biochemistry, Genetics and Molecular Biology	Genetics	Genomics and Proteomics

Biochemistry, Genetics and Molecular Biology	Genetics	Human Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Molecular Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Mutagenesis
Biochemistry, Genetics and Molecular Biology	Genetics	Population Genetics
Biochemistry, Genetics and Molecular Biology	Genetics	Transgenics and Breeding
Biochemistry, Genetics and Molecular Biology	Molecular Biology	Nucleic Acids
Biochemistry, Genetics and Molecular Biology	Molecular Biology	Peptides, Amino Acids, Amines, Amides
Biochemistry, Genetics and Molecular Biology	Physiology	Animal Physiology
Biochemistry, Genetics and Molecular Biology	Physiology	Comparative Physiology
Biochemistry, Genetics and Molecular Biology	Physiology	Human Physiology
Biochemistry, Genetics and Molecular Biology	Physiology	Invertebrate Physiology
Biochemistry, Genetics and Molecular Biology	Physiology	Respiration Physiology
Environmental Science	Ecological Modelling	Environmental Modelling and Software
Environmental Science	Ecology	Animal Ecology
Environmental Science	Ecology	Aquatic Ecology
Environmental Science	Ecology	Behavioral Ecology
Environmental Science	Ecology	Biodiversity and Conservation
Environmental Science	Ecology	Community Ecology
Environmental Science	Ecology	Ecological Economics
Environmental Science	Ecology	Ecological Engineering
Environmental Science	Ecology	Ecological Measurement and Analysis
Environmental Science	Ecology	Ecological Techniques and Equipment
Environmental Science	Ecology	Ecosystem Restoration
Environmental Science	Ecology	Ecosystems, Communities and Organisms
Environmental Science	Ecology	Evolutionary Ecology
Environmental Science	Ecology	Forest Ecology
Environmental Science	Ecology	Human Ecology
Environmental Science	Ecology	Industrial Ecology
Environmental Science	Ecology	Invertebrate Conservation
Environmental Science	Ecology	Landscape Ecology
Environmental Science	Ecology	Marine Ecology
Environmental Science	Ecology	Microbial Ecology
Environmental Science	Ecology	Molecular Ecology
Environmental Science	Ecology	Plant Conservation
Environmental Science	Ecology	Plant Ecology
Environmental Science	Ecology	Population Biology
Environmental Science	Ecology	Statistical Ecology

Environmental Science	Ecology	Terrestrial Ecology
Environmental Science	Ecology	Vertebrate Conservation
Environmental Science	Ecology	Wildlife Preservation
Environmental Science	Global and Planetary Change	Environmental Change
Environmental Science	Global and Planetary Change	Global Change
Environmental Science	Health, Toxicology and Mutagenesis	Ecotoxicology
Environmental Science	Health, Toxicology and Mutagenesis	Environmental Health
Environmental Science	Health, Toxicology and Mutagenesis	Environmental Medicine
Environmental Science	Health, Toxicology and Mutagenesis	Environmental Mutagenesis
Environmental Science	Health, Toxicology and Mutagenesis	Environmental Toxicology
Environmental Science	Health, Toxicology and Mutagenesis	Exposure and Effects on Man
Environmental Science	Health, Toxicology and Mutagenesis	Molecular and Genetic Toxicology
Environmental Science	Health, Toxicology and Mutagenesis	Mutagenesis
Environmental Science	Management, Monitoring, Policy and Law	Agricultural Economics and Policy
Environmental Science	Management, Monitoring, Policy and Law	Agricultural Legislation
Environmental Science	Management, Monitoring, Policy and Law	Corporate Strategy / Environmental
Environmental Science	Management, Monitoring, Policy and Law	Ecosystem Management
Environmental Science	Management, Monitoring, Policy and Law	Energy Policy, Business and Economics
Environmental Science	Management, Monitoring, Policy and Law	Environmental Assessment
Environmental Science	Management, Monitoring, Policy and Law	Environmental Compliance
Environmental Science	Management, Monitoring, Policy and Law	Environmental Data
Environmental Science	Management, Monitoring, Policy and Law	Environmental Economics
Environmental Science	Management, Monitoring, Policy and Law	Environmental Impact Assessment
Environmental Science	Management, Monitoring, Policy and Law	Environmental Law
Environmental Science	Management, Monitoring, Policy and Law	Environmental Legislation and Regulation
Environmental Science	Management, Monitoring, Policy and Law	Environmental Management
Environmental Science	Management, Monitoring, Policy and Law	Environmental Methodology
Environmental Science	Management, Monitoring, Policy and Law	Environmental Monitoring and Analysis
Environmental Science	Management, Monitoring, Policy and Law	Environmental Policy
Environmental Science	Management, Monitoring, Policy and Law	Environmental Risk Assessment
Environmental Science	Management, Monitoring, Policy and Law	Environmental Studies
Environmental Science	Management, Monitoring, Policy and Law	International Policy / Environmental
Environmental Science	Management, Monitoring, Policy and Law	Life Cycle Assessment
Environmental Science	Management, Monitoring, Policy and Law	Occupational Health
Environmental Science	Management, Monitoring, Policy and Law	Resource Management
Environmental Science	Management, Monitoring, Policy and Law	Water Policy
Environmental Science	Nature and Landscape Conservation	Biological Conservation

Environmental Science	Nature and Landscape Conservation	Ecotourism
Environmental Science	Nature and Landscape Conservation	Land Use
Environmental Science	Nature and Landscape Conservation	Materials Conservation
Environmental Science	Nature and Landscape Conservation	Renewable Resources and Conservatio
Environmental Science	Nature and Landscape Conservation	Resource Productivity Improvement
Environmental Science	Nature and Landscape Conservation	Structural Conservation
Immunology and Microbiology	Immunology	Applied Immunology
Immunology and Microbiology	Immunology	Autoimmunity
Immunology and Microbiology	Immunology	Basic Immunology
Immunology and Microbiology	Immunology	Cellular Immunology
Immunology and Microbiology	Immunology	Clinical Immunology
Immunology and Microbiology	Immunology	Diagnostics and Immunology
Immunology and Microbiology	Immunology	Histocompatibility
Immunology and Microbiology	Immunology	Immunochemistry
Immunology and Microbiology	Immunology	Immunogenetics
Immunology and Microbiology	Immunology	Immunological Methodology
Immunology and Microbiology	Immunology	Immunopathogenesis
Immunology and Microbiology	Immunology	Immunopharmacology
Immunology and Microbiology	Immunology	Immunotherapy
Immunology and Microbiology	Immunology	Infection and Immunity
Immunology and Microbiology	Immunology	Inflammation and Allergy
Immunology and Microbiology	Immunology	Molecular Immunology
Immunology and Microbiology	Immunology	Vaccinology
Immunology and Microbiology	Microbiology	Applied Microbiology
Immunology and Microbiology	Microbiology	Bacteriology
Immunology and Microbiology	Microbiology	Biodeterioration, Biodegradation and Bioremediation
Immunology and Microbiology	Microbiology	Clinical Microbiology
Immunology and Microbiology	Microbiology	Cytokines and Lymphokines
Immunology and Microbiology	Microbiology	Diagnostic Microbiology
Immunology and Microbiology	Microbiology	General Microbiology
Immunology and Microbiology	Microbiology	Industrial Microbiology / Enzymology
Immunology and Microbiology	Microbiology	Microbial Functional Genomics
Immunology and Microbiology	Microbiology	Microbiological Methodology
Immunology and Microbiology	Microbiology	Molecular Microbiology
Immunology and Microbiology	Parasitology	Tropical Medicine
Immunology and Microbiology	Virology	Clinical Virology
Immunology and Microbiology	Virology	HIV and AIDS

Immunology and Microbiology	Virology	Virological Methods
Neuroscience	Cellular and Molecular Neuroscience	Molecular Neuroscience
Neuroscience	Developmental Neuroscience	Developmental Neuroscience and Regeneration
Neuroscience	Endocrine and Autonomic Systems	Autonomic Nervous System
Neuroscience	Endocrine and Autonomic Systems	Neuroendocrinology
Neuroscience	Neurology	Clinical Neuropathology
Neuroscience	Neurology	Epilepsy
Neuroscience	Neurology	Neuro-ophthalmology
Neuroscience	Neurology	Neuroimaging
Neuroscience	Neurology	Neurological Research
Neuroscience	Neurology	Pediatric Neurology
Neuroscience	Neuroscience (General)	Clinical Neurophysiology
Neuroscience	Neuroscience (General)	Neural Aging
Neuroscience	Neuroscience (General)	Neuroanatomy
Neuroscience	Neuroscience (General)	Neurobiology
Neuroscience	Neuroscience (General)	Neurochemistry
Neuroscience	Neuroscience (General)	Neurogenetics
Neuroscience	Neuroscience (General)	Neuroimmunology
Neuroscience	Neuroscience (General)	Neuropathology
Neuroscience	Neuroscience (General)	Neuropharmacology
Neuroscience	Neuroscience (General)	Neurophysiology
Neuroscience	Neuroscience (General)	Neuroscience
Neuroscience	Neuroscience (General)	Neuroscience Methodology
Neuroscience	Neuroscience (General)	Neurotoxicology
Pharma	Pharmaceutical Science	Biopharmaceuticals
Pharma	Pharmaceutical Science	Drug Delivery
Pharma	Pharmaceutical Science	Drug Design
Pharma	Pharmaceutical Science	Pharmaceutical Biotechnology
Pharma	Pharmaceutical Science	Pharmaceutical Chemistry
Pharma	Pharmacology	Biochemical Pharmacology
Pharma	Pharmacology	Drug Adverse Reactions and Interactions
Pharma	Pharmacology	Drug Metabolism / Disposition
Pharma	Pharmacology	Endocrine / Exocrine Pharmacology
Pharma	Pharmacology	Immunopharmacology / Pharmacology
Pharma	Pharmacology	Molecular Pharmacology
Pharma	Pharmacology	Pharmacokinetics / Pharmacodynamics
Pharma	Pharmacology	Principles of Pharmacology

Chemical Engineering	Bioengineering	Bioengineering and Manufacturing
Chemical Engineering	Bioengineering	Pharmaceuticals
Chemical Engineering	Catalysis	Biocatalysis
Chemical Engineering	Catalysis	Chemical Reaction Engineering
Chemical Engineering	Catalysis	Petroleum and Fuel Technology
Chemical Engineering	Catalysis	Zeolites and Microporous Materials
Chemical Engineering	Chemical Engineering (General)	Biochemical Engineering
Chemical Engineering	Chemical Engineering (General)	Chemical Engineering
Chemical Engineering	Chemical Engineering (General)	Chemical Kinetics
Chemical Engineering	Chemical Engineering (General)	Chemical Thermodynamics
Chemical Engineering	Chemical Engineering (General)	Electronic / Photonic Materials
Chemical Engineering	Chemical Engineering (General)	Industrial Chemistry
Chemical Engineering	Chemical Engineering (General)	Materials Chemistry and Engineering
Chemical Engineering	Chemical Engineering (General)	Particle Technology
Chemical Engineering	Chemical Engineering (General)	Pigments / Paints / Dyes
Chemical Engineering	Chemical Engineering (General)	Plastics / Rubber Technology
Chemical Engineering	Chemical Engineering (General)	Polymer, Ceramic and Composite Materials Technology
Chemical Engineering	Chemical Engineering (General)	Process Design, Simulation, Control
Chemical Engineering	Chemical Engineering (General)	Sugar Technology
Chemical Engineering	Chemical Engineering (General)	Textile Technology
Chemical Engineering	Colloid and Surface Chemistry	Corrosion
Chemical Engineering	Colloid and Surface Chemistry	Surface Chemistry
Chemical Engineering	Colloid and Surface Chemistry	Surfaces-Interfaces-Colloids
Chemical Engineering	Filtration and Separation	Membrane Technology
Chemical Engineering	Filtration and Separation	Membranes and Separation Technology
Chemical Engineering	Filtration and Separation	Pulp / Water / Wood Technology
Chemical Engineering	Filtration and Separation	Water Treatment, Desalination
Chemical Engineering	Fluid Flow and Transfer Processes	Controlled Release
Chemical Engineering	Fluid Flow and Transfer Processes	Fluid Dynamics
Chemical Engineering	Fluid Flow and Transfer Processes	Fluid Flow
Chemical Engineering	Fluid Flow and Transfer Processes	Fluid Flow / Transfer Processes
Chemical Engineering	Fluid Flow and Transfer Processes	Fluid Mechanics
Chemical Engineering	Fluid Flow and Transfer Processes	Fluids Engineering
Chemical Engineering	Fluid Flow and Transfer Processes	Heat Transfer
Chemical Engineering	Fluid Flow and Transfer Processes	Heat and Mass Transfer
Chemical Engineering	Fluid Flow and Transfer Processes	Hydrodynamics

Chemical Engineering	Fluid Flow and Transfer Processes	Kinetic and Transport Theory of Fluids, Physical Properties of Gases
Chemical Engineering	Fluid Flow and Transfer Processes	Mass Transfer
Chemical Engineering	Fluid Flow and Transfer Processes	Numerical Methods in Hydrodynamics
Chemical Engineering	Fluid Flow and Transfer Processes	Rheology
Chemical Engineering	Fluid Flow and Transfer Processes	Thermodynamics
Chemical Engineering	Fluid Flow and Transfer Processes	Transfer Processing
Chemical Engineering	Process Chemistry and Technology	Plant Design and Management
Chemistry	Analytical Chemistry	Analytical Separations
Chemistry	Analytical Chemistry	Bioanalysis
Chemistry	Analytical Chemistry	Chemometrics
Chemistry	Analytical Chemistry	Electroanalysis
Chemistry	Analytical Chemistry	Laboratory Instrumentation and Automation
Chemistry	Chemistry (General)	Chemistry - General
Chemistry	Chemistry (General)	Organo-Metallic Chemistry
Chemistry	Chemistry (General)	Stereochemistry
Chemistry	Inorganic Chemistry	Bioinorganic Chemistry
Chemistry	Inorganic Chemistry	Coordination Chemistry
Chemistry	Inorganic Chemistry	Inorganic Synthesis
Chemistry	Inorganic Chemistry	Transition Metal Elements
Chemistry	Organic Chemistry	Bioorganic Chemistry
Chemistry	Organic Chemistry	Carbohydrate Chemistry
Chemistry	Organic Chemistry	Crystal Chemistry / Crystallography
Chemistry	Organic Chemistry	Heterocyclic Chemistry
Chemistry	Organic Chemistry	Medicinal Chemistry
Chemistry	Organic Chemistry	Natural Products Chemistry
Chemistry	Organic Chemistry	Organic Synthesis
Chemistry	Organic Chemistry	Physical Organic Chemistry
Chemistry	Organic Chemistry	Terpenes and Steroids
Chemistry	Physical and Theoretical Chemistry	Atomic and Molecular Structure
Chemistry	Physical and Theoretical Chemistry	Biophysical Chemistry
Chemistry	Physical and Theoretical Chemistry	Combinatorial Chemistry
Chemistry	Physical and Theoretical Chemistry	Computational Chemistry
Chemistry	Physical and Theoretical Chemistry	Phase Structure and Relations
Chemistry	Physical and Theoretical Chemistry	Photochemistry
Chemistry	Physical and Theoretical Chemistry	Radiochemistry and Nuclear Chemistry
Chemistry	Physical and Theoretical Chemistry	Thermochemistry and Thermodynamics

Chemistry	Spectroscopy	Atomic Spectroscopy
Chemistry	Spectroscopy	Infrared and Raman Spectroscopy
Chemistry	Spectroscopy	Laser Spectroscopy
Chemistry	Spectroscopy	Mass Spectrometry
Chemistry	Spectroscopy	Molecular Spectroscopy
Chemistry	Spectroscopy	NMR Spectroscopy
Chemistry	Spectroscopy	Spectroscopic Detection
Computer Science	Artificial Intelligence	Artificial Intelligence (General)
Computer Science	Artificial Intelligence	Artificial Intelligence in Control
Computer Science	Artificial Intelligence	Artificial Intelligence, Expert Systems and Knowledge-Based Systems
Computer Science	Artificial Intelligence	Cognitive Science
Computer Science	Artificial Intelligence	Evolutionary Computation, Genetic Algorithms / Programming
Computer Science	Artificial Intelligence	Intelligent Buildings
Computer Science	Artificial Intelligence	Machine Learning
Computer Science	Artificial Intelligence	Natural Language and Computational Linguistics
Computer Science	Artificial Intelligence	Neural Networks
Computer Science	Artificial Intelligence	Reasoning
Computer Science	Artificial Intelligence	Robotics and Autonomous Systems
Computer Science	Computational Theory and Mathematics	Arithmetic and Logic Structures
Computer Science	Computational Theory and Mathematics	Mathematical Methods and Programming
Computer Science	Computational Theory and Mathematics	Symbolic and Algebraic Manipulation
Computer Science	Computer Graphics and Computer-Aided Design	CAD,CAM,CAE
Computer Science	Computer Graphics and Computer-Aided Design	Computer Games
Computer Science	Computer Graphics and Computer-Aided Design	Computer Graphics
Computer Science	Computer Graphics and Computer-Aided Design	Computer-Aided Architectural Design
Computer Science	Computer Graphics and Computer-Aided Design	Graphics, CAD, HCI (General)
Computer Science	Computer Graphics and Computer-Aided Design	Simulation and Modeling
Computer Science	Computer Graphics and Computer-Aided Design	Virtual Reality
Computer Science	Computer Networks and Communications	Computer Communication Networks
Computer Science	Computer Networks and Communications	Input/Output and Data Communications
Computer Science	Computer Networks and Communications	Internet and Web Technology
Computer Science	Computer Networks and Communications	Messaging
Computer Science	Computer Networks and Communications	Network Communications Engineering
Computer Science	Computer Networks and Communications	Networking
Computer Science	Computer Networks and Communications	Wireless Communications

Computer Science	Computer Science (General)	Coding and Information Theory
Computer Science	Computer Science (General)	Computer Interfacing
Computer Science	Computer Science (General)	Computer System Implementation
Computer Science	Computer Science (General)	Computer Systems Organization (General)
Computer Science	Computer Science (General)	Computing Milieux (General)
Computer Science	Computer Science (General)	Data (General)
Computer Science	Computer Science (General)	Data Encryption
Computer Science	Computer Science (General)	Data Storage Representations
Computer Science	Computer Science (General)	Data Structures
Computer Science	Computer Science (General)	IT Management
Computer Science	Computer Science (General)	Object Oriented Technologies
Computer Science	Computer Science (General)	Parallel and Distributed Computing
Computer Science	Computer Science (General)	Performance of Systems
Computer Science	Computer Science (General)	Programming Languages
Computer Science	Computer Science Applications	Administrative Data Processing
Computer Science	Computer Science Applications	Agricultural Computer and Electronic Systems
Computer Science	Computer Science Applications	Applications (General)
Computer Science	Computer Science Applications	Arts and Humanities
Computer Science	Computer Science Applications	Business Intelligence - Data management
Computer Science	Computer Science Applications	Computer Forensics
Computer Science	Computer Science Applications	Computers and Chemical Engineering
Computer Science	Computer Science Applications	Computers and Chemistry
Computer Science	Computer Science Applications	Computers and Psychology
Computer Science	Computer Science Applications	Computers in Business
Computer Science	Computer Science Applications	Computing for Engineers and Scientists
Computer Science	Computer Science Applications	Document and Text Processing
Computer Science	Computer Science Applications	Life and Medical Sciences
Computer Science	Computer Science Applications	Multimedia
Computer Science	Computer Science Applications	Physical Sciences and Engineering
Computer Science	Computer Science Applications	Planning and Scheduling
Computer Science	Computer Science Applications	Simulation
Computer Science	Computer Science Applications	Social and Behavioral Sciences
Computer Science	Computer Science Applications	Special-Purpose and Application-Based Systems
Computer Science	Computer Vision and Pattern Recognition	Machine Vision
Computer Science	Hardware and Architecture	Apple and Macintosh
Computer Science	Hardware and Architecture	Control Structures and Microprogramming
Computer Science	Hardware and Architecture	Embedded Systems

Computer Science	Hardware and Architecture	Hardware and Architecture (General)
Computer Science	Hardware and Architecture	Integrated Circuits
Computer Science	Hardware and Architecture	Logic Design
Computer Science	Hardware and Architecture	Memory Structures
Computer Science	Hardware and Architecture	Performance and Reliability
Computer Science	Hardware and Architecture	Processor Architectures
Computer Science	Hardware and Architecture	Register-Transfer-Level Implementation
Computer Science	Human-Computer Interaction	Computer-Human Interaction
Computer Science	Human-Computer Interaction	Human / Computer Interaction
Computer Science	Information Systems	Information Interfaces and Presentation
Computer Science	Information Systems	Information Processing and Control
Computer Science	Information Systems	Information Search and Retrieval
Computer Science	Information Systems	Information Storage and Retrieval
Computer Science	Information Systems	Information Systems (General)
Computer Science	Information Systems	Information Systems Applications
Computer Science	Information Systems	Models and Principles
Computer Science	Signal Processing	Digital Signal Processing
Computer Science	Signal Processing	Electromagnetics, Signal Processing and Communications
Computer Science	Software	Computer Security
Computer Science	Software	Database Management
Computer Science	Software	Engineering Software
Computer Science	Software	Operating Systems
Computer Science	Software	Programming Techniques
Computer Science	Software	Software (General)
Computer Science	Software	Software Engineering
Computer Science	Software	Standardization and Verification
Earth and Planetary Sciences	Atmospheric Science	Aeronomy
Earth and Planetary Sciences	Atmospheric Science	Agricultural Climatology and Meteorology
Earth and Planetary Sciences	Atmospheric Science	Atmospheric Chemistry
Earth and Planetary Sciences	Atmospheric Science	Atmospheric Physics
Earth and Planetary Sciences	Atmospheric Science	Climatology
Earth and Planetary Sciences	Atmospheric Science	Meteorology
Earth and Planetary Sciences	Computers in Earth Sciences	Computers in Geosciences
Earth and Planetary Sciences	Computers in Earth Sciences	GIS (Geographic Information Systems)
Earth and Planetary Sciences	Computers in Earth Sciences	Remote Sensing and Photogrammetry
Earth and Planetary Sciences	Earth and Planetary Sciences (General)	Extractive Metallurgy
Earth and Planetary Sciences	Earth and Planetary Sciences (General)	Glaciology

Earth and Planetary Sciences	Earth and Planetary Sciences (General)	Mineral Processing
Earth and Planetary Sciences	Earth-Surface Processes	Groundwater Chemistry / Contaminant Hydrology
Earth and Planetary Sciences	Economic Geology	Coal Geology
Earth and Planetary Sciences	Economic Geology	Ore Geology
Earth and Planetary Sciences	Economic Geology	Petroleum Geology and Engineering
Earth and Planetary Sciences	Geochemistry and Petrology	Applied Geochemistry
Earth and Planetary Sciences	Geochemistry and Petrology	Crustal and Mantle Geochemistry
Earth and Planetary Sciences	Geochemistry and Petrology	Exploration Geochemistry
Earth and Planetary Sciences	Geochemistry and Petrology	Geochronology
Earth and Planetary Sciences	Geochemistry and Petrology	Igneous Geochemistry and Petrology
Earth and Planetary Sciences	Geochemistry and Petrology	Isotope Geochemistry
Earth and Planetary Sciences	Geochemistry and Petrology	Metamorphic Geochemistry and Petrology
Earth and Planetary Sciences	Geochemistry and Petrology	Mineralogy
Earth and Planetary Sciences	Geochemistry and Petrology	Organic Geochemistry
Earth and Planetary Sciences	Geochemistry and Petrology	Sedimentary Geochemistry and Petrology
Earth and Planetary Sciences	Geochemistry and Petrology	Volcanology
Earth and Planetary Sciences	Geology	Environmental Geology
Earth and Planetary Sciences	Geology	Marine Geology
Earth and Planetary Sciences	Geology	Mathematical Geology
Earth and Planetary Sciences	Geology	Structural Geology
Earth and Planetary Sciences	Geology	Tectonics
Earth and Planetary Sciences	Geophysics	Applied Geophysics
Earth and Planetary Sciences	Geophysics	Crustal and Mantle Geophysics
Earth and Planetary Sciences	Geophysics	Environmental Physics
Earth and Planetary Sciences	Geophysics	Geomagnetism
Earth and Planetary Sciences	Geophysics	Geophysical Fluid Dynamics
Earth and Planetary Sciences	Geophysics	Geothermics
Earth and Planetary Sciences	Geophysics	Gravity / Geodesy
Earth and Planetary Sciences	Geophysics	Paleomagnetism
Earth and Planetary Sciences	Geophysics	Physics of the Earth and the Atmosphere
Earth and Planetary Sciences	Geophysics	Seismic Exploration
Earth and Planetary Sciences	Geophysics	Seismology
Earth and Planetary Sciences	Geophysics	Tectonophysics
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Coastal / Hydraulic Engineering
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Geomorphology
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Geotechnical Engineering
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Geotechnical Engineering / Engineering Geology

Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Mining Geology and Engineering
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Numerical Methods in Geotechnical Engineering
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Ocean and Coastal Engineering
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Rock Mechanics
Earth and Planetary Sciences	Geotechnical Engineering and Engineering Geology	Soil Mechanics
Earth and Planetary Sciences	Oceanography	Biological Oceanography / Marine Ecology
Earth and Planetary Sciences	Oceanography	Chemical Oceanography / Marine Chemistry
Earth and Planetary Sciences	Oceanography	Geological Oceanography
Earth and Planetary Sciences	Oceanography	Physical Oceanography
Earth and Planetary Sciences	Palaeontology	Micropaleontology
Earth and Planetary Sciences	Palaeontology	Paleobiology
Earth and Planetary Sciences	Palaeontology	Paleobotany / Palynology
Earth and Planetary Sciences	Palaeontology	Paleoenvironments / Paleoclimatology
Earth and Planetary Sciences	Palaeontology	Paleontology
Earth and Planetary Sciences	Space and Planetary Science	Astronomy
Earth and Planetary Sciences	Space and Planetary Science	Cosmochemistry
Earth and Planetary Sciences	Space and Planetary Science	Cosmology
Earth and Planetary Sciences	Space and Planetary Science	Cosmology, Large Scale Structure
Earth and Planetary Sciences	Space and Planetary Science	Exobiology
Earth and Planetary Sciences	Space and Planetary Science	Meteoritics
Earth and Planetary Sciences	Space and Planetary Science	Planetology
Earth and Planetary Sciences	Space and Planetary Science	Solar System, Solar Physics, Planets and Exoplanets
Earth and Planetary Sciences	Space and Planetary Science	Space Science
Earth and Planetary Sciences	Stratigraphy	Precambrian Geology
Earth and Planetary Sciences	Stratigraphy	Quaternary Geology
Earth and Planetary Sciences	Stratigraphy	Sedimentology
Energy	Energy (General)	Coal, Lignite and Peat
Energy	Energy (General)	Energy
Energy	Energy (General)	Energy - General
Energy	Energy (General)	Energy Business, Strategy and Planning
Energy	Energy (General)	Energy Consumption and Utilization
Energy	Energy (General)	Energy Economic Modelling and Forecasting
Energy	Energy (General)	Energy Policy, Business and Economics
Energy	Energy (General)	Energy Storage
Energy	Energy (General)	Energy Supply and Demand Issues
Energy	Energy (General)	Energy and Architecture
Energy	Energy (General)	Fossil Fuels

Energy	Energy (General)	Fossil Fuels - Combustion
Energy	Energy (General)	Fossil Fuels - Environmental Aspects
Energy	Energy (General)	Fossil Fuels - Properties and Composition
Energy	Energy (General)	Fossil Fuels - Reserves, Geology and Exploration
Energy	Energy (General)	Natural Gas
Energy	Energy (General)	Petroleum, Oil Shales and Tar Sands
Energy	Energy Engineering and Power Technology	Electric Power
Energy	Energy Engineering and Power Technology	Electric Power - Control and Instrumentation
Energy	Energy Engineering and Power Technology	Electric Power - Environmental Aspects
Energy	Energy Engineering and Power Technology	Electric Power - Generation
Energy	Energy Engineering and Power Technology	Electric Power - Systems and Networks
Energy	Energy Engineering and Power Technology	Electric Power - Transmission and Distribution
Energy	Fuel Technology	Fossil Fuels - Processing and Production
Energy	Fuel Technology	Fossil Fuels - Products and By-Products
Energy	Fuel Technology	Fossil Fuels - Transport, Handling and Storage
Energy	Fuel Technology	Petroleum and Fuel Technology
Energy	Nuclear Energy and Engineering	Fusion - Research and Technology
Energy	Nuclear Energy and Engineering	Nuclear - Control, Instruments and Measures
Energy	Nuclear Energy and Engineering	Nuclear - Environmental Aspects
Energy	Nuclear Energy and Engineering	Nuclear - Fuel Processing and Production
Energy	Nuclear Energy and Engineering	Nuclear - Reactor Use, Safety and Maintenance
Energy	Nuclear Energy and Engineering	Nuclear - Spent Fuels Reprocessing
Energy	Nuclear Energy and Engineering	Nuclear - Thermal and Hydraulic Engineering and Processes
Energy	Nuclear Energy and Engineering	Nuclear - Transport, Handling and Storage
Energy	Nuclear Energy and Engineering	Nuclear - Uranium Enrichment
Energy	Renewable Energy, Sustainability and the Environment	Biomass and Bioenergy
Energy	Renewable Energy, Sustainability and the Environment	Energy Conservation and Environment
Energy	Renewable Energy, Sustainability and the Environment	Geothermal Energy
Energy	Renewable Energy, Sustainability and the Environment	Geothermics
Energy	Renewable Energy, Sustainability and the Environment	Hydro, Ocean and Tidal Power
Energy	Renewable Energy, Sustainability and the Environment	Hydrogen Energy and Fuel Cells
Energy	Renewable Energy, Sustainability and the Environment	Renewable Energy - Environmental Aspects
Energy	Renewable Energy, Sustainability and the Environment	Renewable Energy and Alternative Technologies
Energy	Renewable Energy, Sustainability and the Environment	Solar Energy
Energy	Renewable Energy, Sustainability and the Environment	Sustainable Architecture
Energy	Renewable Energy, Sustainability and the Environment	Sustainable Energy Resources
Energy	Renewable Energy, Sustainability and the Environment	Wind Power

Engineering	Aerospace Engineering	Aerodynamics
Engineering	Aerospace Engineering	Aerodynamics Engineering
Engineering	Aerospace Engineering	Aeronautics
Engineering	Aerospace Engineering	Aircraft Design
Engineering	Aerospace Engineering	Astronautics
Engineering	Aerospace Engineering	Flight Materials and Structures
Engineering	Aerospace Engineering	Ground Support Systems
Engineering	Aerospace Engineering	Launch and Space Vehicles
Engineering	Aerospace Engineering	Rockets and Propulsion
Engineering	Aerospace Engineering	Space Communications and Satellites
Engineering	Aerospace Engineering	Turbulence
Engineering	Automotive Engineering	Transportation Engineering
Engineering	Civil and Structural Engineering	Analysis and Design (Structures)
Engineering	Civil and Structural Engineering	Behavior of Structures
Engineering	Civil and Structural Engineering	Brickwork
Engineering	Civil and Structural Engineering	Building (General)
Engineering	Civil and Structural Engineering	Building Materials
Engineering	Civil and Structural Engineering	Building Services
Engineering	Civil and Structural Engineering	Building and Construction
Engineering	Civil and Structural Engineering	Carpentry and Joinery
Engineering	Civil and Structural Engineering	Civil Engineering (General)
Engineering	Civil and Structural Engineering	Foundation Engineering
Engineering	Civil and Structural Engineering	Hydrodynamics
Engineering	Civil and Structural Engineering	Intelligent Buildings
Engineering	Civil and Structural Engineering	Materials Durability
Engineering	Civil and Structural Engineering	Materials Performance
Engineering	Civil and Structural Engineering	Materials in Civil Engineering
Engineering	Civil and Structural Engineering	Numerical Methods in Hydrodynamics
Engineering	Civil and Structural Engineering	Numerical Methods in Structural Engineering
Engineering	Civil and Structural Engineering	Pipeline Technology
Engineering	Civil and Structural Engineering	Quantity Surveying
Engineering	Civil and Structural Engineering	Resources in Civil Engineering
Engineering	Civil and Structural Engineering	Soil and Rock Mechanics
Engineering	Civil and Structural Engineering	Structural Acoustics and Vibration
Engineering	Civil and Structural Engineering	Structural Engineering
Engineering	Civil and Structural Engineering	Structural Integrity
Engineering	Civil and Structural Engineering	Structural Mechanics

Engineering	Civil and Structural Engineering	Structural Reliability
Engineering	Civil and Structural Engineering	Systems (Civil Engineering)
Engineering	Civil and Structural Engineering	Tunnelling
Engineering	Civil and Structural Engineering	Water Supply / Quality
Engineering	Civil and Structural Engineering	Water and Sewage
Engineering	Computational Mechanics	Computational Methods
Engineering	Computational Mechanics	Numerical Methods in Engineering
Engineering	Computational Mechanics	Numerical Methods in Engineering Mechanics
Engineering	Computational Mechanics	Probabilistic Mechanics
Engineering	Control and Systems Engineering	Adaptive Control
Engineering	Control and Systems Engineering	Aerospace Control
Engineering	Control and Systems Engineering	Architectures
Engineering	Control and Systems Engineering	Avionics and Control Systems
Engineering	Control and Systems Engineering	Biological Control Systems
Engineering	Control and Systems Engineering	Computer-Aided Control Systems Design
Engineering	Control and Systems Engineering	Control Applications
Engineering	Control and Systems Engineering	Control Systems
Engineering	Control and Systems Engineering	Control Theory
Engineering	Control and Systems Engineering	Control of Chemical and Biotechnological Processes
Engineering	Control and Systems Engineering	Control of Electrical Systems
Engineering	Control and Systems Engineering	Control of Minerals and Materials Processing
Engineering	Control and Systems Engineering	Control of Non-Linear Systems
Engineering	Control and Systems Engineering	Control of Power Systems
Engineering	Control and Systems Engineering	Economic, Political and Financial Control Systems
Engineering	Control and Systems Engineering	Fault Detection and Safety of Control Systems
Engineering	Control and Systems Engineering	Fuzzy Control, Neural Systems and Genetic Algorithms
Engineering	Control and Systems Engineering	Fuzzy Logic
Engineering	Control and Systems Engineering	Global and Educational Aspects of Control
Engineering	Control and Systems Engineering	Land Vehicles Control
Engineering	Control and Systems Engineering	Man-Machine Systems
Engineering	Control and Systems Engineering	Marine Systems Control
Engineering	Control and Systems Engineering	Real-Time Control
Engineering	Control and Systems Engineering	Robotics
Engineering	Control and Systems Engineering	Systems Identification and Signal Processing
Engineering	Electrical and Electronic Engineering	Analog IC Design
Engineering	Electrical and Electronic Engineering	Applied Electronics (General)
Engineering	Electrical and Electronic Engineering	Circuit Design

Engineering	Electrical and Electronic Engineering	Circuit Theory and Analysis
Engineering	Electrical and Electronic Engineering	Computer Engineering
Engineering	Electrical and Electronic Engineering	Design, Manufacturing and Testing
Engineering	Electrical and Electronic Engineering	Digital IC Design
Engineering	Electrical and Electronic Engineering	Electrical Building Services
Engineering	Electrical and Electronic Engineering	Electrical Engineering
Engineering	Electrical and Electronic Engineering	Electrical Installation
Engineering	Electrical and Electronic Engineering	Electrical Wiring
Engineering	Electrical and Electronic Engineering	Electromagnetic Interference
Engineering	Electrical and Electronic Engineering	Electromechanics and Mechatronics
Engineering	Electrical and Electronic Engineering	Electronic Design Automation
Engineering	Electrical and Electronic Engineering	Electronic Devices and Materials
Engineering	Electrical and Electronic Engineering	Electronics (General)
Engineering	Electrical and Electronic Engineering	Electronics Design
Engineering	Electrical and Electronic Engineering	Electronics Servicing and Repair
Engineering	Electrical and Electronic Engineering	Electronics Theory
Engineering	Electrical and Electronic Engineering	Electrostatics
Engineering	Electrical and Electronic Engineering	IS / ASIC / SoC Design
Engineering	Electrical and Electronic Engineering	Image and Video Processing
Engineering	Electrical and Electronic Engineering	Internet / ATM Devices
Engineering	Electrical and Electronic Engineering	Optical Communications Engineering
Engineering	Electrical and Electronic Engineering	Radio and RF Engineering
Engineering	Electrical and Electronic Engineering	Signal Integrity
Engineering	Electrical and Electronic Engineering	TV and Video Electronics
Engineering	Electrical and Electronic Engineering	Telecommunications
Engineering	Engineering (General)	Building Control
Engineering	Engineering (General)	Construction Management
Engineering	Engineering (General)	Construction Project Management
Engineering	Engineering (General)	Engineering Drawing
Engineering	Engineering (General)	Facilities Management
Engineering	Engineering (General)	Legal and Contractual Issues in Construction
Engineering	Engineering (General)	Mechatronics
Engineering	Engineering (General)	Precision Engineering
Engineering	Engineering (General)	Technology in Architecture
Engineering	Industrial and Manufacturing Engineering	Advanced Manufacturing Systems
Engineering	Industrial and Manufacturing Engineering	Agile Manufacturing
Engineering	Industrial and Manufacturing Engineering	Artificial Intelligence in Engineering

Engineering	Industrial and Manufacturing Engineering	Business Strategy and Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	CIM / CAM
Engineering	Industrial and Manufacturing Engineering	Decision Analysis in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Engineering Design
Engineering	Industrial and Manufacturing Engineering	Environmental Impact of Strategies in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Ergonomics
Engineering	Industrial and Manufacturing Engineering	Expert Systems in Engineering
Engineering	Industrial and Manufacturing Engineering	Facilities Design
Engineering	Industrial and Manufacturing Engineering	Facilities Maintenance
Engineering	Industrial and Manufacturing Engineering	Forecasting in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Human Factors
Engineering	Industrial and Manufacturing Engineering	Integrated Product and Process Development
Engineering	Industrial and Manufacturing Engineering	Machine Systems and Engineering
Engineering	Industrial and Manufacturing Engineering	Management Strategy and Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Manufacturing Logistics
Engineering	Industrial and Manufacturing Engineering	Manufacturing Processes and Systems
Engineering	Industrial and Manufacturing Engineering	Manufacturing Systems Engineering
Engineering	Industrial and Manufacturing Engineering	Manufacturing and Instrumentation
Engineering	Industrial and Manufacturing Engineering	Materials Processing
Engineering	Industrial and Manufacturing Engineering	Materials and Inventory Management
Engineering	Industrial and Manufacturing Engineering	Minimization of Risks in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Operational Research in Industrial and Manufacturing Engineering
Engineering	Industrial and Manufacturing Engineering	Optimization of Investment and Resources in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Plant Maintenance
Engineering	Industrial and Manufacturing Engineering	Product and Process Design
Engineering	Industrial and Manufacturing Engineering	Production
Engineering	Industrial and Manufacturing Engineering	Production Economics
Engineering	Industrial and Manufacturing Engineering	Production Management
Engineering	Industrial and Manufacturing Engineering	Production Planning and Control
Engineering	Industrial and Manufacturing Engineering	Production Resource Management
Engineering	Industrial and Manufacturing Engineering	Production Strategy
Engineering	Industrial and Manufacturing Engineering	Quality Planning and Asssurance in Manufacturing
Engineering	Industrial and Manufacturing Engineering	Quality Systems and Management
Engineering	Industrial and Manufacturing Engineering	Rapid Prototyping
Engineering	Industrial and Manufacturing Engineering	Robotics and Industrial Automation

Engineering	Industrial and Manufacturing Engineering	Safety in Manufacturing
Engineering	Industrial and Manufacturing Engineering	Simulation in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Strategic Research and Management in Industrial Engineering
Engineering	Industrial and Manufacturing Engineering	Supply Chain Management
Engineering	Industrial and Manufacturing Engineering	Systems Integration
Engineering	Industrial and Manufacturing Engineering	Workshop Technology
Engineering	Mechanical Engineering	Agricultural Machinery
Engineering	Mechanical Engineering	Dynamics and Vibration
Engineering	Mechanical Engineering	Failure Mechanics
Engineering	Mechanical Engineering	Farm Mechanisation
Engineering	Mechanical Engineering	Fatigue
Engineering	Mechanical Engineering	Fracture Mechanics
Engineering	Mechanical Engineering	Heating, Ventilation and Air Conditioning
Engineering	Mechanical Engineering	Hydraulics
Engineering	Mechanical Engineering	Impact and Damage Mechanics
Engineering	Mechanical Engineering	Life Extension and Condition Monitoring
Engineering	Mechanical Engineering	Lubrication
Engineering	Mechanical Engineering	Machine Theory
Engineering	Mechanical Engineering	Machine Tools
Engineering	Mechanical Engineering	Machines and Mechanisms
Engineering	Mechanical Engineering	Mechanical Engineering Design
Engineering	Mechanical Engineering	Mechanical Testing and Characterization
Engineering	Mechanical Engineering	Metrology
Engineering	Mechanical Engineering	Nondestructive Testing and Evaluation
Engineering	Mechanical Engineering	Pneumatics
Engineering	Mechanical Engineering	Pressure Vessels and Technology
Engineering	Mechanical Engineering	Solid Mechanics
Engineering	Mechanical Engineering	Tribology
Engineering	Mechanical Engineering	Turbomachinery
Engineering	Mechanical Engineering	Wear
Engineering	Mechanics of Materials	Elasticity
Engineering	Mechanics of Materials	Materials Mechanics
Engineering	Mechanics of Materials	Mechanical Properties of Materials
Engineering	Mechanics of Materials	Mechanics, Elasticity, Rheology
Engineering	Mechanics of Materials	Micromechanics
Engineering	Mechanics of Materials	Plasticity

Engineering	Ocean Engineering	Marine Engineering
Engineering	Ocean Engineering	Naval Architecture
Engineering	Ocean Engineering	Ship Operations
Engineering	Safety, Risk, Reliability and Quality	Industrial Health and Safety
Engineering	Safety, Risk, Reliability and Quality	Production Reliability
Engineering	Safety, Risk, Reliability and Quality	Reliability Engineering / Safety
Environmental Science	Environmental Chemistry	Environmental Chemistry, Substances and Processes
Environmental Science	Environmental Chemistry	Fate of Chemicals
Environmental Science	Environmental Chemistry	Particulates
Environmental Science	Environmental Science (General)	Environmental Bioscience and Technology
Environmental Science	Environmental Science (General)	Environmental Disasters
Environmental Science	Environmental Science (General)	Environmental Epidemiology
Environmental Science	Environmental Science (General)	Environmental Physics
Environmental Science	Environmental Science (General)	Environmental Radioactivity
Environmental Science	Environmental Science (General)	Environmental Sciences (General)
Environmental Science	Environmental Science (General)	Environmental Techniques and Equipment
Environmental Science	Environmental Science (General)	Greenhouse Gases
Environmental Science	Environmental Science (General)	Nonrenewable Resources and Conservation
Environmental Science	Environmental Science (General)	Sustainable Development
Environmental Science	Pollution	Air Pollution
Environmental Science	Pollution	Air Quality Management
Environmental Science	Pollution	Clean Air Technology
Environmental Science	Pollution	Decontamination
Environmental Science	Pollution	Environmental Monitoring and Pollution Detection
Environmental Science	Pollution	Freshwater Pollution
Environmental Science	Pollution	Groundwater Pollution and Remediation
Environmental Science	Pollution	Heavy Metals
Environmental Science	Pollution	Marine Pollution
Environmental Science	Pollution	Persistent Organic Chemicals
Environmental Science	Pollution	Pollution Abatement
Environmental Science	Pollution	Pollution Control
Environmental Science	Pollution	Pollution Prevention
Environmental Science	Pollution	Remediation
Environmental Science	Waste Management and Disposal	Bio and Phyto Remediation
Environmental Science	Waste Management and Disposal	Biological Waste
Environmental Science	Waste Management and Disposal	Chemical Waste
Environmental Science	Waste Management and Disposal	Cleaner Production

Environmental Science	Waste Management and Disposal	Hazardous / Toxic Waste
Environmental Science	Waste Management and Disposal	Industrial Waste
Environmental Science	Waste Management and Disposal	Materials Recovery
Environmental Science	Waste Management and Disposal	Mining and Mineral Waste
Environmental Science	Waste Management and Disposal	Nuclear Waste
Environmental Science	Waste Management and Disposal	Recycling
Environmental Science	Waste Management and Disposal	Sanitary Engineering
Environmental Science	Waste Management and Disposal	Solid Waste
Environmental Science	Waste Management and Disposal	Waste Disposal
Environmental Science	Waste Management and Disposal	Waste Management
Environmental Science	Waste Management and Disposal	Waste Minimisation
Environmental Science	Waste Management and Disposal	Waste Treatment
Environmental Science	Waste Management and Disposal	Wastewater Treatment
Environmental Science	Water Science and Technology	Hydrology
Environmental Science	Water Science and Technology	Water Quality
Environmental Science	Water Science and Technology	Water Supply / Quality
Environmental Science	Water Science and Technology	Water Supply Engineering
Environmental Science	Water Science and Technology	Water Supply and Management
Environmental Science	Water Science and Technology	Water and Sewage
Materials Science	Biomaterials	Medical Biomaterials
Materials Science	Ceramics and Composites	Carbon-Carbon Composites
Materials Science	Ceramics and Composites	Ceramic Matrix Composites
Materials Science	Ceramics and Composites	Ceramics
Materials Science	Ceramics and Composites	Composites
Materials Science	Ceramics and Composites	Electroceramics
Materials Science	Ceramics and Composites	Metal Matrix Composites
Materials Science	Ceramics and Composites	Polymer Matrix Composites
Materials Science	Ceramics and Composites	Polymer, Ceramic and Composite Materials Technology
Materials Science	Ceramics and Composites	Textiles and Fibers for Composites
Materials Science	Electronic, Optical and Magnetic Materials	Audio Electronics
Materials Science	Electronic, Optical and Magnetic Materials	Electrical Machines
Materials Science	Electronic, Optical and Magnetic Materials	Electron Microscopy
Materials Science	Electronic, Optical and Magnetic Materials	Electronic / Photonic Materials
Materials Science	Electronic, Optical and Magnetic Materials	Electronic Materials
Materials Science	Electronic, Optical and Magnetic Materials	Electronics (General)
Materials Science	Electronic, Optical and Magnetic Materials	General Microscopy
Materials Science	Electronic, Optical and Magnetic Materials	Internet / ATM Devices

Materials Science	Electronic, Optical and Magnetic Materials	Magnetic Materials
Materials Science	Electronic, Optical and Magnetic Materials	Magnetic Properties and Materials
Materials Science	Electronic, Optical and Magnetic Materials	Microelectronics
Materials Science	Electronic, Optical and Magnetic Materials	Optical Materials
Materials Science	Electronic, Optical and Magnetic Materials	Optics and Lasers
Materials Science	Electronic, Optical and Magnetic Materials	Power Electronics
Materials Science	Electronic, Optical and Magnetic Materials	Security Electronics and Systems
Materials Science	Electronic, Optical and Magnetic Materials	Superconducting Materials
Materials Science	Electronic, Optical and Magnetic Materials	Waveguides and Antennas
Materials Science	Materials Chemistry	Diamond and Related Materials
Materials Science	Materials Chemistry	Materials Chemistry and Engineering
Materials Science	Materials Chemistry	Metallurgy
Materials Science	Materials Chemistry	Physical Metallurgy
Materials Science	Materials Chemistry	Powder Metallurgy
Materials Science	Materials Chemistry	Solid State Chemistry
Materials Science	Materials Chemistry	Supramolecular Science and Biomimetics
Materials Science	Materials Science (General)	Adhesion and Adhesives
Materials Science	Materials Science (General)	Carbon, Fullerenes and Nanotubes
Materials Science	Materials Science (General)	Cement and Concrete
Materials Science	Materials Science (General)	General Materials Science
Materials Science	Materials Science (General)	Materials Analysis and Characterization
Materials Science	Materials Science (General)	Materials Durability
Materials Science	Materials Science (General)	Materials Engineering
Materials Science	Materials Science (General)	Materials Modelling
Materials Science	Materials Science (General)	Materials Performance
Materials Science	Materials Science (General)	Materials Selection
Materials Science	Materials Science (General)	Materials Testing
Materials Science	Materials Science (General)	Non-Metals Processing
Materials Science	Materials Science (General)	Plastics / Rubber Technology
Materials Science	Materials Science (General)	Pulp / Water / Wood Technology
Materials Science	Materials Science (General)	Zeolites and Microporous Materials
Materials Science	Metals and Alloys	Corrosion of Metals
Materials Science	Metals and Alloys	Extractive Metallurgy
Materials Science	Metals and Alloys	Ferrous Metals
Materials Science	Metals and Alloys	Metals Processing
Materials Science	Metals and Alloys	Nonferrous Metals
Materials Science	Metals and Alloys	Refractory Metals

Materials Science	Polymers and Plastics	Interdisciplinary Macromolecular Science and Engineering
Materials Science	Polymers and Plastics	Plastics Technology
Materials Science	Polymers and Plastics	Polymer Chemistry
Materials Science	Polymers and Plastics	Polymer Engineering and Processing
Materials Science	Polymers and Plastics	Polymer Physics
Materials Science	Polymers and Plastics	Polymer Science and Technology
Materials Science	Surfaces, Coatings and Films	Paints and Coatings
Materials Science	Surfaces, Coatings and Films	Surfaces and Interfaces (Materials Science)
Mathematics	Algebra and Number Theory	Algebraic Geometry
Mathematics	Algebra and Number Theory	Associative Rings and Algebras
Mathematics	Algebra and Number Theory	Category Theory, Homological Algebra
Mathematics	Algebra and Number Theory	Commutative Rings and Algebras
Mathematics	Algebra and Number Theory	Field Theory and Polynomials
Mathematics	Algebra and Number Theory	Linear and Multilinear Algebra, Matrix Theory
Mathematics	Algebra and Number Theory	Nonassociative Rings and Algebras
Mathematics	Algebra and Number Theory	Number Theory
Mathematics	Algebra and Number Theory	Real Functions
Mathematics	Analysis	Approximations and Expansions
Mathematics	Analysis	Functional Analysis
Mathematics	Analysis	Functions of a Complex Variable
Mathematics	Analysis	Integral Equations
Mathematics	Analysis	Integral Transforms, Operational Calculus
Mathematics	Analysis	Measure and Integration
Mathematics	Analysis	Operator Theory
Mathematics	Analysis	Sequences, Series, Summability
Mathematics	Analysis	Several Complex Variables and Analytic Spaces
Mathematics	Analysis	Special Functions
Mathematics	Applied Mathematics	Biomathematics
Mathematics	Applied Mathematics	Differential Geometry
Mathematics	Applied Mathematics	Engineering Mathematics
Mathematics	Applied Mathematics	Finite Differences and Functional Equations
Mathematics	Applied Mathematics	Fourier Analysis
Mathematics	Applied Mathematics	Fuzzy Sets and Systems
Mathematics	Applied Mathematics	Group Theory and Generalizations
Mathematics	Applied Mathematics	Mathematical Biosciences
Mathematics	Applied Mathematics	Mathematical and Quantitative Methods (General)
Mathematics	Applied Mathematics	Ordinary Differential Equations

Mathematics	Applied Mathematics	Partial Differential Equations
Mathematics	Applied Mathematics	Relativity
Mathematics	Computational Mathematics	Analysis of Algorithms and Problem Complexity
Mathematics	Computational Mathematics	Computation by Abstract Devices
Mathematics	Computational Mathematics	Logics and Meanings of Programs
Mathematics	Computational Mathematics	Mathematical Programming
Mathematics	Computational Mathematics	Natural Computation
Mathematics	Computational Mathematics	Quantum Computing
Mathematics	Computational Mathematics	Theory and Mathematics (General)
Mathematics	Control and Optimization	Calculus of Variations and Optimal Control, Optimization
Mathematics	Control and Optimization	Optimal Control
Mathematics	Control and Optimization	Optimization
Mathematics	Control and Optimization	Robust Control
Mathematics	Control and Optimization	Systems Theory, Control
Mathematics	Discrete Mathematics and Combinatorics	Discrete Mathematics / Combinatorics
Mathematics	Discrete Mathematics and Combinatorics	Order, Lattices, Ordered Algebraic Structures
Mathematics	Geometry and Topology	Abstract Harmonic Analysis
Mathematics	Geometry and Topology	Algebraic Topology
Mathematics	Geometry and Topology	Convex Sets and Related Geometric Topics
Mathematics	Geometry and Topology	General Topology
Mathematics	Geometry and Topology	Geometry
Mathematics	Geometry and Topology	Global Analysis - Analysis of Manifolds
Mathematics	Geometry and Topology	K-Theory
Mathematics	Geometry and Topology	Manifolds and Cell Complexes
Mathematics	Geometry and Topology	Topological Groups, Lie Groups
Mathematics	Logic	Mathematical Logic and Formal Languages
Mathematics	Logic	Mathematical Logic and Foundations
Mathematics	Logic	Set Theory
Mathematics	Mathematical Physics	Computational Physics
Mathematics	Mathematical Physics	Mathematical Methods in Physics
Mathematics	Mathematical Physics	Potential Theory
Mathematics	Mathematical Physics	Relativity and Gravitation
Mathematics	Mathematics (General)	General Mathematical Systems
Mathematics	Mathematics (General)	Mathematical Economics and Game Theory
Mathematics	Mathematics (General)	Mathematics History and Biography
Mathematics	Modelling and Simulation	Linear Programming
Mathematics	Modelling and Simulation	Modeling (including Finite Elements)

Mathematics	Modelling and Simulation	Modelling
Mathematics	Statistics and Probability	Probability Theory and Stochastic Processes
Mathematics	Statistics and Probability	Statistics
Mathematics	Theoretical Computer Science	Computer Science
Physics and Astronomy	Acoustics and Ultrasonics	Acoustics
Physics and Astronomy	Acoustics and Ultrasonics	Ultrasonics
Physics and Astronomy	Astronomy and Astrophysics	Astronomy
Physics and Astronomy	Astronomy and Astrophysics	Astronomy, Astrophysics and Space Science (General)
Physics and Astronomy	Astronomy and Astrophysics	Astrophysics
Physics and Astronomy	Astronomy and Astrophysics	Cosmology, Large Scale Structure
Physics and Astronomy	Astronomy and Astrophysics	Extragalactic Astronomy
Physics and Astronomy	Astronomy and Astrophysics	Galaxy (Milky Way)
Physics and Astronomy	Astronomy and Astrophysics	Instrumentation, Techniques, and Astronomical Observations
Physics and Astronomy	Astronomy and Astrophysics	Interstellar and Intergalactic Matter
Physics and Astronomy	Astronomy and Astrophysics	Solar System, Solar Physics, Planets and Exoplanets
Physics and Astronomy	Astronomy and Astrophysics	Space Science
Physics and Astronomy	Astronomy and Astrophysics	Stars, Variable Stars
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Atomic Spectra and Interactions with Photons
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Atomic and Molecular Collision Processes and Interactions
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Atomic and Molecular Physics
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Electron Microscopy
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Electron States
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Electronic Structure of Atoms and Molecules: Theory
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Infrared Physics
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Molecular Spectra and Interactions of Molecules with Photons
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Optics
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Optics with Atomic, Molecular and Plasma Physics (General)
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Physics of Beams
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Quantum Electronics
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Studies of Special Atoms, Molecules and their Ions: Clusters
Physics and Astronomy	Atomic and Molecular Physics, and Optics	Superconductivity
Physics and Astronomy	Condensed Matter Physics	Condensed Matter: Electronic Structure, Electrical, Magnetic and Optical Properties
Physics and Astronomy	Condensed Matter Physics	Condensed Matter: Structure, Thermal and Mechanical Properties

Physics and Astronomy	Condensed Matter Physics	Dielectric Properties and Materials
Physics and Astronomy	Condensed Matter Physics	Electron and Ion Emission by Liquids and Solids, Impact Phenomena
Physics and Astronomy	Condensed Matter Physics	Electronic Transport in Condensed Matter
Physics and Astronomy	Condensed Matter Physics	Equations of State, Phase Equilibria, and Phase Transitions
Physics and Astronomy	Condensed Matter Physics	Lattice Dynamics and Crystal Statistics
Physics and Astronomy	Condensed Matter Physics	Low Temperature Physics
Physics and Astronomy	Condensed Matter Physics	Low-Dimensional Systems and Nanostructures
Physics and Astronomy	Condensed Matter Physics	Magnetic Resonances and Relaxations in Condensed Matter, MÃ¶ssbauer Effect
Physics and Astronomy	Condensed Matter Physics	Mechanical and Acoustical Properties of Condensed Matter
Physics and Astronomy	Condensed Matter Physics	Optical Properties and Condensed Matter Spectroscopy and other Interactions of Matter with Radiation
Physics and Astronomy	Condensed Matter Physics	Quantum Fluids and Solids, Liquid and Solid Helium
Physics and Astronomy	Condensed Matter Physics	Semiconductor Physics
Physics and Astronomy	Condensed Matter Physics	Solid State Physics (General)
Physics and Astronomy	Condensed Matter Physics	Structure of Liquids and Solids, Crystallography
Physics and Astronomy	Condensed Matter Physics	Theory of Liquids and Solutions
Physics and Astronomy	Condensed Matter Physics	Thermal Properties of Condensed Matter
Physics and Astronomy	Condensed Matter Physics	Transport Properties of Condensed Matter (Nonelectronic)
Physics and Astronomy	Instrumentation	Experimental Methods and Instrumentation for Elementary-Particle and Nuclear Physics
Physics and Astronomy	Instrumentation	Instrumentation (General)
Physics and Astronomy	Instrumentation	Instrumentation and Techniques for Atomic and Molecular Physics
Physics and Astronomy	Instrumentation	Instrumentation and Techniques in Experimental Physics
Physics and Astronomy	Instrumentation	Measurement Science, General Laboratory Techniques and Instrumentation Systems
Physics and Astronomy	Instrumentation	Metrology
Physics and Astronomy	Nuclear and High Energy Physics	Acoustics
Physics and Astronomy	Nuclear and High Energy Physics	Fundamental Areas of Phenomenology (Including Applications)
Physics and Astronomy	Nuclear and High Energy Physics	General Theory of Fields and Particles
Physics and Astronomy	Nuclear and High Energy Physics	High Energy Physics (General)
Physics and Astronomy	Nuclear and High Energy Physics	Nuclear Physics (General)
Physics and Astronomy	Nuclear and High Energy Physics	Nuclear Reactions and Scattering: General
Physics and Astronomy	Nuclear and High Energy Physics	Nuclear Reactions and Scattering: Specific Reactions
Physics and Astronomy	Nuclear and High Energy Physics	Nuclear Structure

Physics and Astronomy	Nuclear and High Energy Physics	Properties of Specific Nuclei Listed by Mass Ranges
Physics and Astronomy	Nuclear and High Energy Physics	Properties of Specific Particles and Resonances
Physics and Astronomy	Nuclear and High Energy Physics	Radioactivity and Electromagnetic Transitions
Physics and Astronomy	Nuclear and High Energy Physics	Specific Reactions and Phenomenology
Physics and Astronomy	Nuclear and High Energy Physics	Specific Theories and Interaction Models - Particle Systematics
Physics and Astronomy	Nuclear and High Energy Physics	The Physics of Plasmas and Electric Discharges
Physics and Astronomy	Physics and Astronomy (General)	Biological and Medical Physics
Physics and Astronomy	Physics and Astronomy (General)	Chemical Physics
Physics and Astronomy	Physics and Astronomy (General)	Classical and Quantum Physic
Physics and Astronomy	Physics and Astronomy (General)	Electrostatics
Physics and Astronomy	Physics and Astronomy (General)	Foundations of Physics
Physics and Astronomy	Physics and Astronomy (General)	Interdisciplinary Physics (General)
Physics and Astronomy	Physics and Astronomy (General)	Materials Physics
Physics and Astronomy	Physics and Astronomy (General)	Neutron Scattering
Physics and Astronomy	Physics and Astronomy (General)	Physics (General)
Physics and Astronomy	Physics and Astronomy (General)	Physics Communication, Education, History and Philosophy
Physics and Astronomy	Physics and Astronomy (General)	Relativity and Gravitation
Physics and Astronomy	Physics and Astronomy (General)	Vacuum Technology
Physics and Astronomy	Statistical and Nonlinear Physics	Fluid Dynamics
Physics and Astronomy	Statistical and Nonlinear Physics	Kinetic and Transport Theory of Fluids, Physical Properties of Gases
Physics and Astronomy	Statistical and Nonlinear Physics	Mechanics, Elasticity, Rheology
Physics and Astronomy	Statistical and Nonlinear Physics	Nonlinear, Statistical and Mathematical Physics (General)
Physics and Astronomy	Statistical and Nonlinear Physics	Statistical Physics and Thermodynamics
Physics and Astronomy	Surfaces and Interfaces	Biosurfaces and Biointerfaces
Physics and Astronomy	Surfaces and Interfaces	Processing of Surfaces
Physics and Astronomy	Surfaces and Interfaces	Structure and Properties of Surfaces, Interfaces and Thin Films
Physics and Astronomy	Surfaces and Interfaces	Surfaces and Interfaces (General)
Arts and Humanities	Arts and Humanities (General)	Anthropology
Arts and Humanities	Arts and Humanities (General)	Architectural Design
Arts and Humanities	Arts and Humanities (General)	Architectural Studies
Arts and Humanities	Arts and Humanities (General)	Architecture Project Management
Arts and Humanities	Arts and Humanities (General)	Cinematography
Arts and Humanities	Arts and Humanities (General)	Classics
Arts and Humanities	Arts and Humanities (General)	Computer-Aided Architectural Design

Arts and Humanities	Arts and Humanities (General)	Directing and Producing
Arts and Humanities	Arts and Humanities (General)	General Architecture
Arts and Humanities	Arts and Humanities (General)	Journalism
Arts and Humanities	Arts and Humanities (General)	Museology (General)
Arts and Humanities	Arts and Humanities (General)	Museology and Museum Management
Arts and Humanities	Arts and Humanities (General)	Music
Arts and Humanities	Arts and Humanities (General)	Philosophy
Arts and Humanities	Arts and Humanities (General)	Planning and Design of Building Types
Arts and Humanities	Arts and Humanities (General)	Poetics / Literary Theory
Arts and Humanities	Arts and Humanities (General)	Religious Studies
Arts and Humanities	Arts and Humanities (General)	Screenwriting
Arts and Humanities	Arts and Humanities (General)	Sustainable Architecture
Arts and Humanities	Arts and Humanities (General)	Theatre
Arts and Humanities	Arts and Humanities (General)	Urban Design
Arts and Humanities	Arts and Humanities (General)	Visual Arts
Arts and Humanities	History	Building Conservation
Arts and Humanities	History	Economic History (General)
Arts and Humanities	History	Economic History: Agriculture, Natural Resources, Environment, and Extractive Industries
Arts and Humanities	History	Economic History: Financial Markets and Institutions
Arts and Humanities	History	Economic History: Government, War, Law, and Regulation
Arts and Humanities	History	Economic History: Labor, Demography, Education, Income, and Wealth
Arts and Humanities	History	Economic History: Transport, International and Domestic Trade, Energy, and Other Services
Arts and Humanities	History	History and Philosophy of Science
Arts and Humanities	History	History of Economic Thought since 1925
Arts and Humanities	History	Mathematics History and Biography
Arts and Humanities	History	Methodology and History of Economic Thought (General)
Arts and Humanities	Language and Linguistics	Applied Linguistics
Arts and Humanities	Language and Linguistics	Computational Linguistics
Arts and Humanities	Language and Linguistics	Discourse, Pragmatics and Sociolinguistics
Arts and Humanities	Language and Linguistics	History and Philosophy of Language / Linguistics
Arts and Humanities	Language and Linguistics	Interdisciplinary Linguistics (General)
Arts and Humanities	Language and Linguistics	Journalism and Mass Communications (General)
Arts and Humanities	Language and Linguistics	Linguistics
Arts and Humanities	Language and Linguistics	Literature

Arts and Humanities	Language and Linguistics	Mass Communications
Arts and Humanities	Language and Linguistics	Neurolinguistics and Psycholinguistics
Arts and Humanities	Language and Linguistics	Speech / Language Pathology
Arts and Humanities	Language and Linguistics	Translation and Dictionaries
Arts and Humanities	Media Technology	Audio Engineering
Arts and Humanities	Media Technology	Audio and Music Technology (General)
Arts and Humanities	Media Technology	Broadcast Engineering and Communications Technology (General)
Arts and Humanities	Media Technology	Computer Games
Arts and Humanities	Media Technology	Computer Graphics
Arts and Humanities	Media Technology	Digital Imaging
Arts and Humanities	Media Technology	Digital Video
Arts and Humanities	Media Technology	Film
Arts and Humanities	Media Technology	Film and TV Production (General)
Arts and Humanities	Media Technology	Graphics, Animation, New Media and Games (General)
Arts and Humanities	Media Technology	Music Technology
Arts and Humanities	Media Technology	New Media
Arts and Humanities	Media Technology	Photography and Digital Imaging (General)
Arts and Humanities	Media Technology	Recording
Arts and Humanities	Media Technology	Television
Arts and Humanities	Media Technology	Visual Effects and Animation
Business, Management and Accounting	Accounting	Auditing
Business, Management and Accounting	Business and International Management	International Business Management
Business, Management and Accounting	Business, Management and Accounting (General)	Administration
Business, Management and Accounting	Business, Management and Accounting (General)	Beauty and Fashion
Business, Management and Accounting	Business, Management and Accounting (General)	Business
Business, Management and Accounting	Business, Management and Accounting (General)	Business Venturing
Business, Management and Accounting	Business, Management and Accounting (General)	Construction Management
Business, Management and Accounting	Business, Management and Accounting (General)	Corporate Management
Business, Management and Accounting	Business, Management and Accounting (General)	Entrepreneurship
Business, Management and Accounting	Business, Management and Accounting (General)	Facilities Management
Business, Management and Accounting	Business, Management and Accounting (General)	Farm Management
Business, Management and Accounting	Business, Management and Accounting (General)	Fisheries Economics and Management
Business, Management and Accounting	Business, Management and Accounting (General)	Industry Studies: Manufacturing
Business, Management and Accounting	Business, Management and Accounting (General)	Industry Studies: Primary Products and Construction
Business, Management and Accounting	Business, Management and Accounting (General)	Industry Studies: Utilities and Transportation
Business, Management and Accounting	Business, Management and Accounting (General)	Management Development of Education

Business, Management and Accounting	Business, Management and Accounting (General)	Museology and Museum Management
Business, Management and Accounting	Business, Management and Accounting (General)	Pharmacy Management
Business, Management and Accounting	Business, Management and Accounting (General)	Plant Design and Management
Business, Management and Accounting	Business, Management and Accounting (General)	Public Administration
Business, Management and Accounting	Business, Management and Accounting (General)	Purchasing and Supply Management
Business, Management and Accounting	Business, Management and Accounting (General)	Retailing
Business, Management and Accounting	Management Information Systems	Computer Security
Business, Management and Accounting	Management Information Systems	Computers in Business
Business, Management and Accounting	Management Information Systems	Digital Forensics
Business, Management and Accounting	Management Information Systems	Electronic Security
Business, Management and Accounting	Management Information Systems	IT Security and Administration
Business, Management and Accounting	Management Information Systems	Strategy and Strategic Management
Business, Management and Accounting	Management of Technology and Innovation	Product Innovation Management
Business, Management and Accounting	Management of Technology and Innovation	R and D Policy, Planning, Management
Business, Management and Accounting	Management of Technology and Innovation	Technology in Architecture
Business, Management and Accounting	Marketing	Administration and Marketing
Business, Management and Accounting	Marketing	Advertising and Public Relations
Business, Management and Accounting	Marketing	Business to Business Marketing
Business, Management and Accounting	Marketing	Food Marketing and Management
Business, Management and Accounting	Marketing	Industrial Marketing
Business, Management and Accounting	Marketing	International Marketing
Business, Management and Accounting	Marketing	Marketing, Marketing Research
Business, Management and Accounting	Marketing	Sales and Marketing
Business, Management and Accounting	Organizational Behavior and Human Resource Management	Human Resources Management
Business, Management and Accounting	Organizational Behavior and Human Resource Management	Time Allocation, Work Behavior and Employment Determination
Business, Management and Accounting	Strategy and Management	Architecture Project Management
Business, Management and Accounting	Strategy and Management	Construction Project Management
Business, Management and Accounting	Strategy and Management	Energy Business, Strategy and Planning
Business, Management and Accounting	Strategy and Management	Firm Objectives, Organization, and Behavior
Business, Management and Accounting	Strategy and Management	Industrial Organization (General)
Business, Management and Accounting	Strategy and Management	Management Consulting
Business, Management and Accounting	Strategy and Management	Market Structure, Firm Strategy and Market Performance
Business, Management and Accounting	Strategy and Management	Physical Security and Crime Prevention
Business, Management and Accounting	Strategy and Management	Production Management
Business, Management and Accounting	Strategy and Management	Production Strategy
Business, Management and Accounting	Strategy and Management	Production and Organizations

Business, Management and Accounting	Strategy and Management	Security Management
Business, Management and Accounting	Strategy and Management	Strategy and Strategic Management
Business, Management and Accounting	Strategy and Management	Travel and Tourism Management
Business, Management and Accounting	Tourism, Leisure and Hospitality Management	Conference Industry
Business, Management and Accounting	Tourism, Leisure and Hospitality Management	Ecotourism
Business, Management and Accounting	Tourism, Leisure and Hospitality Management	Hospitality Management
Business, Management and Accounting	Tourism, Leisure and Hospitality Management	Leisure and Recreation Management
Business, Management and Accounting	Tourism, Leisure and Hospitality Management	Travel and Tourism Management
Decision Sciences	Decision Sciences (General)	Analysis of Collective Decision-Making
Decision Sciences	Decision Sciences (General)	Data Collection and Data Estimation Methodolog
Decision Sciences	Decision Sciences (General)	Decision Sciences and Biomedicine
Decision Sciences	Decision Sciences (General)	Decision Sciences and Computers
Decision Sciences	Decision Sciences (General)	Decision Sciences and Social Sciences
Decision Sciences	Decision Sciences (General)	Decision Sciences and Transportation
Decision Sciences	Decision Sciences (General)	Decision Sciences: Applications
Decision Sciences	Decision Sciences (General)	Decision Sciences: Other Applications
Decision Sciences	Decision Sciences (General)	Economics, Econometrics
Decision Sciences	Decision Sciences (General)	Fuzzy Sets and Systems
Decision Sciences	Decision Sciences (General)	Game Theory and Bargaining Theory
Decision Sciences	Decision Sciences (General)	Information Systems, Decision Support Systems
Decision Sciences	Decision Sciences (General)	Mathematical and Quantitative Methods: Design of Experiments
Decision Sciences	Decision Sciences (General)	Operations Management
Decision Sciences	Decision Sciences (General)	Planning, Forecasting
Decision Sciences	Decision Sciences (General)	Simulation
Decision Sciences	Information Systems and Management	Accounting Information Systems
Decision Sciences	Information Systems and Management	Information Systems, Decision Support Systems
Decision Sciences	Information Systems and Management	Operations Research and Computers
Decision Sciences	Management Science and Operations Research	Decision Sciences: Applications
Decision Sciences	Management Science and Operations Research	Mathematical Programming, Networks
Decision Sciences	Management Science and Operations Research	Operations Management
Decision Sciences	Management Science and Operations Research	Operations Research / Management Science Methods
Decision Sciences	Management Science and Operations Research	Operations Research and Computers
Decision Sciences	Statistics, Probability and Uncertainty	Information and Uncertainty
Decision Sciences	Statistics, Probability and Uncertainty	Stochastic Models
Economics, Econometrics and Finance	Economics and Econometrics	Decision Sciences and Biomedicine

Economics, Econometrics and Finance	Economics and Econometrics	Econometric Methods: Multiple / Simultaneous Equation Models
Economics, Econometrics and Finance	Economics and Econometrics	Econometric Modeling
Economics, Econometrics and Finance	Economics and Econometrics	Econometric and Statistical Methods: Special Topics
Economics, Econometrics and Finance	Economics and Econometrics	Economic Methodology
Economics, Econometrics and Finance	Economics and Econometrics	Economics, Econometrics
Economics, Econometrics and Finance	Economics and Econometrics	International Economics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Business Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Capitalist Systems
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Comparative Economic Systems
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Demographic Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Development Planning and Policy
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Distribution
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Econometric and Statistical Methods: General
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic Development
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic Development, Technological Change, and Growth (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic Growth and Aggregate Productivity
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History: Agriculture, Natural Resources, Environment, and Extractive Industries
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History: Financial Markets and Institutions
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History: Government, War, Law, and Regulation
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History: Labor, Demography, Education, Income, and Wealth
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic History: Transport, International and Domestic Trade, Energy, and Other Services
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic Systems (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economic Welfare
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economics of Technological Change
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Economywide Country Studies
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Education Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Educational Finance
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Fiscal Policies and Behavior of Economic Agents
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Game Theory and Bargaining Theory
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	General Aggregative Models
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	General Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	General Economics and Teaching (General)

Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	General Equilibrium and Disequilibrium
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	General Spatial Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Health Economics
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	History of Economic Thought since 1925
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Household Analysis
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Household Behavior
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	International Factor Movements and International Business
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Labor and Demographic Economics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Labor-Management Relations, Trade Unions and Collective Bargaining
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Macroeconomic Aspects of International Trade and Finance
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Macroeconomic Aspects of Public Finance, Macroeconomic Policy, and General Outlook
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Macroeconomic and Monetary Economics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Market Structure and Pricing
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Methodology and History of Economic Thought (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Microeconomics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Mobility, Unemployment and Vacancies
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Monetary Policy, Central Banking, and the Supply of Money
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Money and Interest Rates
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	National Government Expenditures and Related Policies
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Particular Labor Markets
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Prices, Business Fluctuations, and Cycles
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Production Analysis and Firm Location
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Public Economics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Public Economics: Miscellaneous Issues
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Publicly Provided Goods
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Socialist Institutions and their Transitions
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Socialist Systems and Transitional Economies
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Taxation, Subsidies and Revenue
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Time Allocation, Work Behavior and Employment Determination
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Urban, Rural and Regional Economics (General)
Economics, Econometrics and Finance	Economics, Econometrics and Finance (General)	Wages, Compensation and Labor Costs
Economics, Econometrics and Finance	Finance	Consumption, Saving, Production, Employment, and Investment
Economics, Econometrics and Finance	Finance	Corporate Finance and Governance

Economics, Econometrics and Finance	Finance	Financial Economics (General)
Economics, Econometrics and Finance	Finance	Financial Institutions and Services
Economics, Econometrics and Finance	Finance	Fixed Income / Debt Capital Markets
Economics, Econometrics and Finance	Finance	General Financial Markets
Economics, Econometrics and Finance	Finance	International Factor Movements and International Business
Economics, Econometrics and Finance	Finance	International Finance
Economics, Econometrics and Finance	Finance	Investment Management
Economics, Econometrics and Finance	Finance	Macroeconomic Aspects of International Trade and Finance
Economics, Econometrics and Finance	Finance	Planning, Forecasting
Economics, Econometrics and Finance	Finance	Property
Economics, Econometrics and Finance	Finance	Property Valuation
Economics, Econometrics and Finance	Finance	Trade
Economics, Econometrics and Finance	Finance	Valuation
Psychology	Applied Psychology	Applied Psychology (General)
Psychology	Applied Psychology	Computers and Psychology
Psychology	Applied Psychology	Counseling Psychology
Psychology	Applied Psychology	Criminal Behaviour and Psychology
Psychology	Applied Psychology	Economic and Consumer Psychology
Psychology	Applied Psychology	Engineering Psychology
Psychology	Applied Psychology	Environmental Psychology
Psychology	Applied Psychology	Individual Differences
Psychology	Applied Psychology	Industrial Psychology
Psychology	Applied Psychology	Organizational Psychology
Psychology	Applied Psychology	Political Psychology
Psychology	Applied Psychology	Traffic and Transport Psychology
Psychology	Clinical Psychology	Addictions
Psychology	Clinical Psychology	Anxiety Disorders
Psychology	Clinical Psychology	Clinical Psychology (General)
Psychology	Developmental and Educational Psychology	Adolescent Psychology
Psychology	Developmental and Educational Psychology	Child Psychology
Psychology	Developmental and Educational Psychology	Childhood Studies
Psychology	Developmental and Educational Psychology	Developmental and Educational Psychology (General)
Psychology	Developmental and Educational Psychology	Educational Research
Psychology	Developmental and Educational Psychology	Higher Education
Psychology	Developmental and Educational Psychology	Psychology of Adulthood
Psychology	Developmental and Educational Psychology	Psychology of Aging
Psychology	Developmental and Educational Psychology	School Psychology

Psychology	Developmental and Educational Psychology	Social Gerontology
Psychology	Developmental and Educational Psychology	Special Education
Psychology	Experimental and Cognitive Psychology	Behavioral and Cognitive Therapy
Psychology	Experimental and Cognitive Psychology	Cognitive Psychology
Psychology	Experimental and Cognitive Psychology	Experimental Psychology
Psychology	Experimental and Cognitive Psychology	Experimental and Cognitive Psychology (General)
Psychology	Experimental and Cognitive Psychology	Mathematical and Computational Psychology
Psychology	Neuropsychology and Physiological Psychology	Clinical Neuropsychology
Psychology	Neuropsychology and Physiological Psychology	Neuropsychology
Psychology	Neuropsychology and Physiological Psychology	Neuroscience and Physiological Psychology (General)
Psychology	Neuropsychology and Physiological Psychology	Physiological Psychology
Psychology	Psychology (General)	General Psychology
Psychology	Psychology (General)	Organizational Behavioral Psychology
Psychology	Psychology (General)	Parapsychology
Psychology	Social Psychology	Geriatrics and Gerontology
Psychology	Social Psychology	Personality
Psychology	Social Psychology	Personality, Social and Criminal Psychology (General)
Psychology	Social Psychology	Psychology and Law
Social Sciences	Development	Object Conservation
Social Sciences	Education	Adult Education
Social Sciences	Education	Adult Learning
Social Sciences	Education	Architectural Studies
Social Sciences	Education	Assessment
Social Sciences	Education	Behavioral Problems
Social Sciences	Education	Comparative Education
Social Sciences	Education	Computer-Assisted Learning
Social Sciences	Education	Computer-Based Instruction
Social Sciences	Education	Continuing Education
Social Sciences	Education	Curriculum Development
Social Sciences	Education	Curriculum Studies
Social Sciences	Education	Development Education
Social Sciences	Education	Distance Education
Social Sciences	Education	Economics of Education
Social Sciences	Education	Education (General)
Social Sciences	Education	Education Economics
Social Sciences	Education	Educational Administration
Social Sciences	Education	Educational Evaluation

Social Sciences	Education	Educational Psychology
Social Sciences	Education	Educational Research
Social Sciences	Education	Educational Technology
Social Sciences	Education	Effective Education
Social Sciences	Education	General Economics and Teaching (General)
Social Sciences	Education	Higher Education
Social Sciences	Education	Higher Education Administration
Social Sciences	Education	Instructional Processes/Teaching Methods
Social Sciences	Education	Learning Disabilities
Social Sciences	Education	Learning and Instruction
Social Sciences	Education	Life Long Education
Social Sciences	Education	Management Development of Education
Social Sciences	Education	Measurement/Testing
Social Sciences	Education	Methodology
Social Sciences	Education	Organization and Leadership
Social Sciences	Education	Philosophy of Education
Social Sciences	Education	Physically Handicapped
Social Sciences	Education	Policy and Planning
Social Sciences	Education	Policy, Planning and Implementation
Social Sciences	Education	Politics of Education
Social Sciences	Education	Research Techniques and Statistics
Social Sciences	Education	School Administration
Social Sciences	Education	School Effectiveness and Improvement
Social Sciences	Education	Science Education
Social Sciences	Education	Sociology of Education
Social Sciences	Education	Special Education
Social Sciences	Education	Teacher Education
Social Sciences	Education	Teacher Effectiveness
Social Sciences	Education	Teaching Practices
Social Sciences	Education	Teaching of Economics
Social Sciences	Education	Teaching, Learning and Student & Faculty
Social Sciences	Education	Testing
Social Sciences	Forensics (General)	Crime Scene Investigation
Social Sciences	Forensics (General)	Criminal Behaviour and Psychology
Social Sciences	Forensics (General)	Criminalistics
Social Sciences	Forensics (General)	Forensic Chemistry and Biology
Social Sciences	Forensics (General)	Forensic Pathology

Social Sciences	Forensics (General)	Forensic Science (General)
Social Sciences	Forensics (General)	Forensic Specialities
Social Sciences	Forensics (General)	Forensics
Social Sciences	Forensics (General)	Fraud and White-Collar Crime
Social Sciences	Forensics (General)	Investigation
Social Sciences	Geography, Planning and Development	Building Conservation
Social Sciences	Geography, Planning and Development	Cartography
Social Sciences	Geography, Planning and Development	Conservation (General)
Social Sciences	Geography, Planning and Development	Cultural Geography
Social Sciences	Geography, Planning and Development	Demography and Population Studies
Social Sciences	Geography, Planning and Development	Development
Social Sciences	Geography, Planning and Development	Economic Geography
Social Sciences	Geography, Planning and Development	Environmental Change
Social Sciences	Geography, Planning and Development	Geographical Information Systems
Social Sciences	Geography, Planning and Development	Geography (General)
Social Sciences	Geography, Planning and Development	Historical Geography
Social Sciences	Geography, Planning and Development	Human Geography (General)
Social Sciences	Geography, Planning and Development	Marine Geography
Social Sciences	Geography, Planning and Development	Medical Geography
Social Sciences	Geography, Planning and Development	Natural Hazards
Social Sciences	Geography, Planning and Development	Physical Geography
Social Sciences	Geography, Planning and Development	Planning and Design of Building Types
Social Sciences	Geography, Planning and Development	Political Geography
Social Sciences	Geography, Planning and Development	Rural Geography
Social Sciences	Geography, Planning and Development	Social Geography
Social Sciences	Geography, Planning and Development	Urban Design
Social Sciences	Geography, Planning and Development	Urban Geography
Social Sciences	Geography, Planning and Development	Urban and Regional Planning (General)
Social Sciences	Human Factors and Ergonomics	Ergonomics
Social Sciences	Human Factors and Ergonomics	Human Factors
Social Sciences	Law	Air and Space Law
Social Sciences	Law	Banking
Social Sciences	Law	Basic Areas of Law and Economics
Social Sciences	Law	Building Control
Social Sciences	Law	Civil Procedure
Social Sciences	Law	Commercial Law
Social Sciences	Law	Comparative Law

Social Sciences	Law	Competition and Antitrust Law
Social Sciences	Law	Computer Law
Social Sciences	Law	Constitutional / Administrative Law
Social Sciences	Law	Criminal Justice
Social Sciences	Law	Criminal Law
Social Sciences	Law	Criminology and Criminal Justice
Social Sciences	Law	Energy Legislation and Regulation
Social Sciences	Law	European Law
Social Sciences	Law	Food Policy
Social Sciences	Law	Food Standards, Laws and Regulations
Social Sciences	Law	General / Theory / Philosophy of Law
Social Sciences	Law	Human Rights
Social Sciences	Law	Information Policy
Social Sciences	Law	Insurance
Social Sciences	Law	Labour and Employment
Social Sciences	Law	Law and Economics (General)
Social Sciences	Law	Law and Economics: Legal Procedure, the Legal System and Illegal Behavior
Social Sciences	Law	Legal and Contractual Issues in Construction
Social Sciences	Law	Maritime Law
Social Sciences	Law	Natural Resources / Environmental Law
Social Sciences	Law	Other Substantive Areas of Law and Economics
Social Sciences	Law	Patent, Trademark and Copyright Law
Social Sciences	Law	Private International Law
Social Sciences	Law	Psychology and Law
Social Sciences	Law	Public International Law
Social Sciences	Law	Regulation and Business Law
Social Sciences	Law	Regulation and Industrial Policy
Social Sciences	Law	Social Law
Social Sciences	Law	Taxation
Social Sciences	Law	Transportation
Social Sciences	Library and Information Sciences	Collection Development and Management
Social Sciences	Library and Information Sciences	Continuing Professional Education in Librarianship
Social Sciences	Library and Information Sciences	Digital Libraries
Social Sciences	Library and Information Sciences	Education for Information Science
Social Sciences	Library and Information Sciences	Education for Librarianship
Social Sciences	Library and Information Sciences	Government Information and Libraries

Social Sciences	Library and Information Sciences	Information / Knowledge Management
Social Sciences	Library and Information Sciences	Information Science and Management (General)
Social Sciences	Library and Information Sciences	Information in Organizations
Social Sciences	Library and Information Sciences	Legal Aspects of Library and Information Science
Social Sciences	Library and Information Sciences	Library Acquisitions
Social Sciences	Library and Information Sciences	Library Automation and Networks
Social Sciences	Library and Information Sciences	Library Instruction / User Training
Social Sciences	Library and Information Sciences	Library Science (General)
Social Sciences	Library and Information Sciences	Library Technical Services
Social Sciences	Library and Information Sciences	Library Theory and Research
Social Sciences	Library and Information Sciences	Library User Services
Social Sciences	Library and Information Sciences	Library and Information Systems
Social Sciences	Library and Information Sciences	Scientometrics, Bibliometrics
Social Sciences	Library and Information Sciences	User and Usage Studes
Social Sciences	Linguistics and Language	Applied Linguistics
Social Sciences	Linguistics and Language	Computational Linguistics
Social Sciences	Linguistics and Language	Discourse, Pragmatics and Sociolinguistics
Social Sciences	Linguistics and Language	History and Philosophy of Language / Linguistics
Social Sciences	Linguistics and Language	Interdisciplinary Linguistics (General)
Social Sciences	Linguistics and Language	Linguistics
Social Sciences	Linguistics and Language	Neurolinguistics and Psycholinguistics
Social Sciences	Linguistics and Language	Speech / Language Pathology
Social Sciences	Linguistics and Language	Translation and Dictionaries
Social Sciences	Safety Research	Electronic Security
Social Sciences	Safety Research	Investigation
Social Sciences	Safety Research	National Security
Social Sciences	Safety Research	Physical Security and Crime Prevention
Social Sciences	Safety Research	Safety
Social Sciences	Safety Research	Security Training
Social Sciences	Social Sciences (General)	Cultural Sociology
Social Sciences	Social Sciences (General)	Multidiscipline
Social Sciences	Social Sciences (General)	Social Welfare and Social Work
Social Sciences	Sociology and Political Science	Africa
Social Sciences	Sociology and Political Science	Area Studies (General)
Social Sciences	Sociology and Political Science	Asia
Social Sciences	Sociology and Political Science	Community and Urban Sociology
Social Sciences	Sociology and Political Science	Comparative Politics

Social Sciences	Sociology and Political Science	Crisis Management / Conflict Resolution
Social Sciences	Sociology and Political Science	Demographic Economics
Social Sciences	Sociology and Political Science	Diplomacy
Social Sciences	Sociology and Political Science	Economy and Society
Social Sciences	Sociology and Political Science	Environmental Politics
Social Sciences	Sociology and Political Science	Environmental Sociology
Social Sciences	Sociology and Political Science	Europe
Social Sciences	Sociology and Political Science	Foreign Affairs
Social Sciences	Sociology and Political Science	Health, Education, and Welfare (General)
Social Sciences	Sociology and Political Science	Intergroup Relations
Social Sciences	Sociology and Political Science	International Relations (General)
Social Sciences	Sociology and Political Science	National Budget, Deficit, and Debt
Social Sciences	Sociology and Political Science	National Government Expenditures and Related Policies
Social Sciences	Sociology and Political Science	Political Communication
Social Sciences	Sociology and Political Science	Political Economy
Social Sciences	Sociology and Political Science	Political Institutions and Policy (General)
Social Sciences	Sociology and Political Science	Political Methodology
Social Sciences	Sociology and Political Science	Political Philosophy
Social Sciences	Sociology and Political Science	Political Science (General)
Social Sciences	Sociology and Political Science	Political Sociology
Social Sciences	Sociology and Political Science	Political Systems
Social Sciences	Sociology and Political Science	Political Theory
Social Sciences	Sociology and Political Science	Public Administration
Social Sciences	Sociology and Political Science	Public Economics (General)
Social Sciences	Sociology and Political Science	Public Economics: Miscellaneous Issues
Social Sciences	Sociology and Political Science	Public Policy
Social Sciences	Sociology and Political Science	Publicly Provided Goods
Social Sciences	Sociology and Political Science	Race and Politics
Social Sciences	Sociology and Political Science	Regional Government Analysis
Social Sciences	Sociology and Political Science	Social Networks
Social Sciences	Sociology and Political Science	Sociology (General)
Social Sciences	Sociology and Political Science	Sociology of Health
Social Sciences	Sociology and Political Science	Sociology of Knowledge
Social Sciences	Sociology and Political Science	Sociology of Leisure and Tourism
Social Sciences	Sociology and Political Science	Sociology of Science and Technology
Social Sciences	Sociology and Political Science	Sociology of Work
Social Sciences	Sociology and Political Science	Sociology of the Family

Social Sciences	Sociology and Political Science	State and Local Governmen
Social Sciences	Sociology and Political Science	Structure and Scope of Government
Social Sciences	Sociology and Political Science	Taxation, Subsidies and Revenue
Social Sciences	Sociology and Political Science	Urban Politics
Social Sciences	Sociology and Political Science	Urban Studies
Social Sciences	Sociology and Political Science	Welfare and Poverty
Social Sciences	Sociology and Political Science	Women's Studies
Social Sciences	Transportation	Transportation Geography
Social Sciences	Transportation	Transportation Modelling/Methodological
Social Sciences	Transportation	Transportation Policy and Practice
Social Sciences	Transportation	Transportation Research (General)
Social Sciences	Transportation	Transportation Systems
Social Sciences	Transportation	Transportation Technology
Social Sciences	Transportation	Transportation and Environment
Dentistry	Anesthesiology	Dental Anaesthesia
Dentistry	Basic Science	Basic Sciences for Dentistry
Dentistry	Dentistry (General)	Dental Medicine, Surgery and Pathology
Dentistry	Dentistry (General)	Dental Microbiology and Infection
Dentistry	Dentistry (General)	Dentistry
Dentistry	Oral Surgery	Dentistry and Oral Surgery
Dentistry	Pediatrics	Paediatric Dentistry
Dentistry	Pharmacology	Dental Therapeutics and Pharmacology
Dentistry	Prosthodontics	Prosthetic Dentistry
Health Professions	Athletic Training	Sports Science
Health Professions	Basic Science	Basic Medical Science
Health Professions	Clinical Lab Science	Clinical Laboratory Science
Health Professions	Clinical Lab Science	Medical Laboratory Technicians
Health Professions	Complementary Medicine	Acupuncture and Oriental Medicine
Health Professions	Complementary Medicine	Herbal Medicine
Health Professions	Health Information Management and Coding	Health Information Management
Health Professions	Health Professions (General)	Emergency Medical Services
Health Professions	Health Professions (General)	Health Professions
Health Professions	Health Professions (General)	Operating Theatre Technicians and Assistants
Health Professions	Health Professions (General)	Pharmacognosy
Health Professions	Health Professions (General)	Professional Resources
Health Professions	Hospital Admin and Management	Health Information Management
Health Professions	Imaging Technologies	Diagnostic Imaging

Health Professions	Imaging Technologies	Radiological and Ultrasound Technology
Health Professions	Massage & Manual Therapy	Manual Therapy
Health Professions	Massage & Manual Therapy	Massage Therapy
Health Professions	Medical Assisting	Medical Assisting and Transcription
Health Professions	Medical Transcription	Medical Assisting and Transcription
Health Professions	Optometry Technician	Optometry
Health Professions	Physical Therapy and Rehabilitation	Physical Therapy
Health Professions	Physical Therapy and Rehabilitation	Rehabilitation
Health Professions	Respiratory Therapy	Respiratory Care
Medicine	Allergy	Allergy and Clinical Immunology
Medicine	Anatomy	Cytology
Medicine	Anatomy	Neuroanatomy, Cellular Neurobiology
Medicine	Anatomy	Osteology
Medicine	Basic Science	Basic Medical Science
Medicine	Behavioral Science	Health Care Delivery
Medicine	Behavioral Science	Hospital Administration and Care
Medicine	Behavioral Science	Medical Informatics
Medicine	Behavioral Science	Medical Statistics
Medicine	Behavioral Science	Social Medicine (General)
Medicine	Behavioral Science	Social and Behavioral Sciences
Medicine	Behavioral Science	Substance Abuse
Medicine	Biochemistry	Clinical Chemistry
Medicine	Cardiology	Cardiology and Cardiovascular Medicine
Medicine	Cardiology	Electrocardiography
Medicine	Cell Biology	Cellular Biology
Medicine	Complementary Medicine	Acupuncture and Oriental Medicine
Medicine	Complementary Medicine	Herbal Medicine
Medicine	Complementary Medicine	Holistic Medicine
Medicine	Complementary Medicine	Massage Therapy
Medicine	Complementary Medicine	Osteopathy
Medicine	Dermatology	Lasers in Medicine
Medicine	Emergency	Emergency Medicine
Medicine	Emergency	Emergency Surgery/Trauma
Medicine	Endocrinology	Endocrinology and Metabolism
Medicine	Gastroenterology	Gastroenterology and Hepatology
Medicine	Gastroenterology	Pancreatology
Medicine	General Medicine	Clinical Chemistry

Medicine	General Medicine	Clinical Medicine
Medicine	General Medicine	Diseases
Medicine	General Medicine	Education in Medicine
Medicine	General Medicine	Evidence-Based Medicine
Medicine	General Medicine	Forensic Medicine
Medicine	General Medicine	Internal Medicine
Medicine	General Medicine	Laboratory Medicine
Medicine	General Medicine	Medicaid and Medicare
Medicine	General Medicine	Medical Administration
Medicine	General Medicine	Medical Atlases
Medicine	General Medicine	Medical Biotechnology
Medicine	General Medicine	Medical Caregiving
Medicine	General Medicine	Medical Diagnosis
Medicine	General Medicine	Medical Education and Training
Medicine	General Medicine	Medical Equipment & Techniques
Medicine	General Medicine	Medical Essays
Medicine	General Medicine	Medical Ethics
Medicine	General Medicine	Medical History
Medicine	General Medicine	Medical Instruments and Supplies
Medicine	General Medicine	Medical Practice Management and Reimbursement
Medicine	General Medicine	Medical Reference
Medicine	General Medicine	Medical Research
Medicine	General Medicine	Medical Terminology
Medicine	General Medicine	Medical Transportation
Medicine	General Medicine	Mental Health
Medicine	General Medicine	Nosology
Medicine	General Medicine	Perinatology and Neonatology
Medicine	General Medicine	Pharmacology - Drug Refs
Medicine	General Medicine	Pharmacy
Medicine	General Medicine	Physician and Patient
Medicine	General Medicine	Physicians
Medicine	General Medicine	Preventive Medicine
Medicine	General Medicine	Primary Care/General Practice
Medicine	General Medicine	Prosthesis
Medicine	General Medicine	Public Health
Medicine	General Medicine	Reproductive Medicine
Medicine	General Medicine	Review and Reference

Medicine	General Medicine	Space Medicine and Life Sciences
Medicine	General Medicine	Terminal Care
Medicine	General Medicine	Transplantation
Medicine	General Surgery	Breast Surgery
Medicine	General Surgery	Colon & Rectal Surgery
Medicine	General Surgery	Emergency Surgery/Trauma
Medicine	General Surgery	Gastrointestinal Surgery
Medicine	General Surgery	Gynaecology and Obstetric Surgery
Medicine	General Surgery	Medical Equipment and Techniques
Medicine	General Surgery	Neurosurgery
Medicine	General Surgery	Oral Maxillofacial Surgery
Medicine	General Surgery	Orthopaedics and Orthopaedic Surgery
Medicine	General Surgery	Otolaryngology/Head and Neck/ENT
Medicine	General Surgery	Paediatric Surgery
Medicine	General Surgery	Plastic Surgery
Medicine	General Surgery	Surgery (General)
Medicine	General Surgery	Thoracic Surgery
Medicine	General Surgery	Transplantation
Medicine	Genetics	Clinical Genetics
Medicine	Immunology	Applied Immunology
Medicine	Immunology	Autoimmunity
Medicine	Immunology	Basic Immunology
Medicine	Immunology	Cellular Immunology
Medicine	Immunology	Clinical Immunology
Medicine	Immunology	Cytokines and Lymphokines
Medicine	Immunology	Histocompatibility
Medicine	Immunology	Immunochemistry
Medicine	Immunology	Immunogenetics
Medicine	Immunology	Immunological Methodology
Medicine	Immunology	Immunopathogenesis
Medicine	Immunology	Immunopharmacology
Medicine	Immunology	Immunotherapy
Medicine	Immunology	Infection and Immunity
Medicine	Immunology	Inflammation and Allergy
Medicine	Immunology	Molecular Immunology
Medicine	Immunology	Vaccinology
Medicine	Infectious Disease	AIDS and HIV

Medicine	Infectious Disease	Infectious Disease (General)
Medicine	Infectious Disease	Infectious Diseases and Chemotherapy
Medicine	Infectious Disease	Parasitology (Human)
Medicine	Infectious Disease	Tropical Medicine
Medicine	Infectious Disease	Viral Diseases
Medicine	Neurology	Clinical Neurology
Medicine	Neurology	Medical Neuroscience (General)
Medicine	Neurology	Neuropathology
Medicine	Neurology	Neuropharmacology, Psychopharmacology
Medicine	Neurology	Neurophysiology
Medicine	Neurology	Sleep Medicine
Medicine	Obstetrics/Gynecology	Foetal Medicine
Medicine	Obstetrics/Gynecology	Gynaecological Oncology
Medicine	Obstetrics/Gynecology	Gynaecology & Obstetric Surgery
Medicine	Obstetrics/Gynecology	Obstetrics & Gynaecology (General)
Medicine	Obstetrics/Gynecology	Obstetrics and Gynecology
Medicine	Obstetrics/Gynecology	Reproductive Medicine
Medicine	Occupational Medicine	Public, Environmental and Occupational Health
Medicine	Oncology	Cancer
Medicine	Oncology	Chemotherapy
Medicine	Oncology	Gynaecological Oncology
Medicine	Orthopaedics	Orthopaedics & Orthopaedic Surgery
Medicine	Orthopaedics	Orthopedics and Biomechanics
Medicine	Otolaryngology	Otolaryngology/Head & Neck/ENT
Medicine	Pathology	Cytology
Medicine	Pathology	Forensic Medicine
Medicine	Pathology	Forensic Pathology
Medicine	Pathology	Gross Pathology
Medicine	Pathology	Histopathology
Medicine	Pathology	Neuropathology
Medicine	Pediatrics	Paediatric Allergy
Medicine	Pediatrics	Paediatric Cardiology
Medicine	Pediatrics	Paediatric Gastroenterology
Medicine	Pediatrics	Paediatric Respiratory Medicine
Medicine	Pediatrics	Paediatric Rheumatology
Medicine	Pediatrics	Paediatrics (General)
Medicine	Pharmacology	Clinical Pharmacology

Medicine	Pharmacology	Neuropharmacology, Psychopharmacology
Medicine	Physical Medicine and Rehab	Physical Medicine & Rehabilitation
Medicine	Physiology	Cardiovascular Physiology
Medicine	Physiology	Neurophysiology
Medicine	Physiology	Pathophysiology
Medicine	Physiology	Physiology (General)
Medicine	Psychiatry	Behavioural Medicine
Medicine	Psychiatry	Child Psychiatry
Medicine	Psychiatry	Forensic Psychiatry
Medicine	Psychiatry	Geriatric Psychiatry
Medicine	Psychiatry	Psychiatry (General)
Medicine	Pulmonary and Respiratory	Pulmonary and Respiratory Medicine
Medicine	Radiology	Magnetic Resonance Imaging
Medicine	Radiology	Nuclear Medicine
Medicine	Radiology	Radiology (General)
Medicine	Radiology	Radiology, Nuclear Medicine and Medical Imaging
Medicine	Radiology	Therapeutic Imaging
Medicine	Radiology	Tomography
Medicine	Radiology	Ultrasonography
Medicine	Rheumatology	Osteology
Nursing	Community and Home Care	Social Work
Nursing	Community and Home Care	Sociology and Social Policy
Nursing	Informatics	Health Care Delivery
Nursing	Informatics	Hospital Administration and Care
Nursing	Informatics	Medical Informatics
Nursing	Issues and Trends	Ethics, Law and Philosophy
Nursing	Issues and Trends	Health Policy
Nursing	Issues and Trends	Health Promotion
Nursing	Medical Surgical	Dermatology and Wound Care
Nursing	Medical Surgical	General Clinical Nursing
Nursing	Medical Surgical	Healing
Nursing	Medical Surgical	Medical, Surgical - Advanced Practice
Nursing	Medical Surgical	Medical-Surgical
Nursing	Medical Surgical	Mens Health
Nursing	Medical Surgical	Orthopaedic Nursing
Nursing	Medical Surgical	Renal and Urological Nursing
Nursing	Medical Surgical	Sexual Health

Nursing	Medical Surgical	Surgical Nursing
Nursing	Nursing - LPN	Fundamentals & Skills
Nursing	Nursing - LPN	Geriatric Nursing
Nursing	Nursing - LPN	Issues/Trends
Nursing	Nursing - LPN	Leadership/Management
Nursing	Nursing - LPN	Maternity/Women's Health
Nursing	Nursing - LPN	Medical Surgical Texts
Nursing	Nursing - LPN	Nurse Practitioner
Nursing	Nursing - LPN	Nutrition
Nursing	Nursing - LPN	Pediatirc Nursing
Nursing	Nursing - LPN	Pharmacology - Texts
Nursing	Nursing - LPN	Psychiatric Mental Hlth Nursing
Nursing	Nursing - LPN	Reviews/NCLEX
Nursing	Nursing - RN	Anatomy & Physiology
Nursing	Nursing - RN	Care Planning
Nursing	Nursing - RN	Case Management
Nursing	Nursing - RN	Critical Care
Nursing	Nursing - RN	Dictionaries -Medicine
Nursing	Nursing - RN	Dictionary
Nursing	Nursing - RN	Dosages and Solutions
Nursing	Nursing - RN	Drug References
Nursing	Nursing - RN	Education
Nursing	Nursing - RN	Electrocardiography
Nursing	Nursing - RN	Fundamentals and Skills
Nursing	Nursing - RN	Gerontology
Nursing	Nursing - RN	Health Assessment
Nursing	Nursing - RN	Home Health
Nursing	Nursing - RN	Informatics
Nursing	Nursing - RN	Issues and Trends
Nursing	Nursing - RN	Lab and Diagnostic Tests
Nursing	Nursing - RN	Lab/Diagnostic Tests
Nursing	Nursing - RN	Leadership and Management
Nursing	Nursing - RN	Maternity and Women's Health
Nursing	Nursing - RN	Medical Surgical
Nursing	Nursing - RN	Midwifery
Nursing	Nursing - RN	Nurse Practitioner
Nursing	Nursing - RN	Nursing (General)

Nursing	Nursing - RN	Nursing Pharmacology
Nursing	Nursing - RN	Nursing Process and Diagnosis
Nursing	Nursing - RN	Nutrition
Nursing	Nursing - RN	Occupational Health
Nursing	Nursing - RN	Oncology
Nursing	Nursing - RN	PathoPhysiology
Nursing	Nursing - RN	Patient Education
Nursing	Nursing - RN	Pediatric
Nursing	Nursing - RN	Perinatology and Neonatology
Nursing	Nursing - RN	Perioperative / Nurse Anesthesia
Nursing	Nursing - RN	Physical Therapy and Rehabilitation
Nursing	Nursing - RN	Psychiatric Mental Health
Nursing	Nursing - RN	Research
Nursing	Nursing - RN	Review/NCLEX
Nursing	Nursing - RN	Theory
Nursing	Occupational Health	Public, Environmental and Occupational Health
Nursing	Perioperative / Nurse Anesthesia	Nursing: Anesthesia
Nursing	Psychiatric Mental Health	Communication and Counselling Skills
Nursing	Psychiatric Mental Health	Learning Disabilities
Nursing	Psychiatric Mental Health	Neurological Nursing
Nursing	Research	Nursing Education
Nursing	Research	Nursing Research
Nursing	Review/NCLEX	Review
Nursing	Review/NCLEX	Revision Aids and Study Skills
Pharma	Pharmaceutical Science	Drug Dispensing
Pharma	Pharmaceutical Science	Drug Manufacturing and Packaging
Pharma	Pharmaceutical Science	Hospital Pharmacy
Pharma	Pharmaceutical Science	Pharmaceutical Analysis
Pharma	Pharmaceutical Science	Pharmaceutical Quality Control
Pharma	Pharmaceutical Science	Pharmaceutical Technology
Pharma	Pharmaceutical Science	Pharmacoeconomics
Pharma	Pharmaceutical Science	Pharmacoepidemiology
Pharma	Pharmaceutical Science	Pharmacotherapy
Pharma	Pharmaceutical Science	Pharmacy
Pharma	Pharmaceutical Science	Pharmacy Management
Pharma	Pharmaceutical Science	Pharmacy Technician
Pharma	Pharmacology	Cardiovascular Pharmacology

Pharma	Pharmacology	Clinical Pharmacology (Therapeutics)
Pharma	Pharmacology	Clinical Trials
Pharma	Pharmacology	Ethnopharmacology
Pharma	Pharmacology	Gastrointestinal Pharmacology
Pharma	Pharmacology	Neoplastic (Cancer) Pharmacology
Pharma	Pharmacology	Psychoneuropharmacology
Pharma	Pharmacology	Pulmonary Pharmacology
Pharma	Pharmacology	Renal and Electrolyte Pharmacology
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Avian	Avian Medicine
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Equine	Veterinary Medicine: Equine
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Food Animals	Veterinary Medicine: Food Animals
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Large Animals	Large Animal Medicine
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Large Animals	Veterinary Surgery (Large Animal)
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Small Animals and Exotics	Fish Medicine
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Small Animals and Exotics	Veterinary Medicine: Small Animals
Veterinary Science and Veterinary Medicine	Veterinary Medicine - Small Animals and Exotics	Veterinary Surgery (Small Animal)
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Vet: Anaesthesiology, Chemotherapy
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Medicine
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Pharmacology and Toxicology
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Preventive Medicine
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Surgery
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Surgery (General)
Veterinary Science and Veterinary Medicine	Veterinary Medicine General	Veterinary Surgery (Small Animal)
Veterinary Science and Veterinary Medicine	Veterinary Science	Vet: Parasitology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Anatomy
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Immunology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Microbiology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Parasitology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Pathology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Physiology
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Sciences
Veterinary Science and Veterinary Medicine	Veterinary Science	Veterinary Surgery