European Masters in Human Language Science and Technology (HLST)

Department of Computer Science
Department of Intelligent Computer Systems
Institute of Linguistics

COURSE CATALOGUE

2010/11

Assessable Components for Re-sit Sessions.

Please note the following with regards to Assessable Components for Re-sit Sessions (as per University Assessment Regulations, 2009)

5. (1) Unless in special circumstances and with the approval of the Board, all students on the same Study-Unit shall be assessed by the same method/s of assessment. Supplementary Assessments shall normally have the same mode of assessment as the corresponding first assessment, provided that:

(a) when all the components making up the Assessment are re-assessable, students shall only be required to re-sit the failed component/s; and

(b) when it is not possible or practical for a failed component of the first Assessment to be re-assessed, the mark obtained in that component in the first sit shall be retained and students shall be required to re-sit any other remaining component/s. If this is not sufficient to ensure an overall pass, students shall normally need to refer the Study-Unit to the next year, if they are eligible for conditional progression.

If a component cannot be re-assessed as part of the resit of a study-unit, this will be specified in the study-unit description.

COURSE DESCRIPTIONS

CSA3216 - Search Engine Technology

Study-Unit Coordinator:	Mr. Angelo Dalli
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	3

Search Engines are an important cornerstone of all Internet-based applications, together with traditional Database applications. Exciting new developments in the field have enabled large unstructured datasets to be handled alongside traditional structured data. Appropriate tools and techniques will be discussed together with a variety of examples involving all major components of a search engine using the Google architecture as a working example. This course will cover the following topics:

- Fundamental Concepts of Information Retrieval
- Boolean, Vector, Probabilistic and Fuzzy Ranking Models
- Evaluation of Results, Precision and Recall
- Query Languages (Boolean, Probabilistic, SQL)
- Weighting of Query Terms
- Simple optimizations: Zipf's Law, stop words, stemming
- Search Engine Architecture
- Ranking on the Web: Introduction to PageRank and HITS
- Multimedia Search Technology

Course work compliments the theoretical material and will involve a mixture of theoretical research and simple programming.

Method of Assessment: Examination: (60%) Assignment: (40%)

Duration of Examination: 3 Hrs

Textbooks:

- Baeza-Yates, Ricardo. Ribeiro-Neto, Berthier. 1999. *Modern Information Retrieval*. Addison Wesley, New York.
- Brin, Sergey. Page, Lawrence. 1998. "The Anatomy of a Large-Scale Hypertextual Web Search Engine". Stanford University, California.

CSA3220 - Machine Learning and Expert Systems

Study-Unit Coordinator:	Dr. John Abela
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	3

PART ONE – Expert Systems and Fuzzy Logic (14 hrs)

Expert Systems (5 hrs)

Expert Systems are considered by many to be the most important contribution of A.I. to the wider world of computing. Hundreds of expert systems have been successfully implemented worldwide. This part of the course introduces the students to the history, principles, design, and implementation of modern production-rule expert systems.

Fuzzy Logic (9 hrs)

Since it was invented in the 70s to the present day, fuzzy logic has slowly gained in popularity. Fuzzy logic arose from the need for a mathematical formalism to characterize the concept of uncertainty (or fuzziness). Today we find fuzzy logic controllers in automobile transmissions, home appliances, cameras, VCRs, industrial machinery, trains, and many other devices. We introduce the student to the basic principles of fuzzy logic and fuzzy sets and then proceed to study the design and implementation of fuzzy logic controllers as used in many devices. The course Assignment will involve the implementation of a Fuzzy Logic Controller.

PART TWO – Machine Learning (28 hrs)

Both pattern recognition and machine learning belong to the most advanced areas of A.I. Numerical methods combined with A.I. techniques have been especially successful in pattern recognition. Research in Machine Learning is now recognised as one of the most important areas of A.I. as well as having application to knowledge acquisition in A.I. systems and contributing to the understanding of human cognition.

Part (I): Machine Learning

Topics discussed:

- Principles of learning machines, Gold's Theorem;
- Concepts and Categories in Cognitive Science;
- Computational learning theory (COLT);
- PAC-learning;
- Grammatical inference;
- Concept learning;
- Find-S, Candidate Elimination, and the ID-3 learning algorithms.

Part (II): Pattern Recognition

Topics discussed:

- Clustering techniques;
- Linear discriminant analysis;
- Pattern Feature Extraction;
- Pattern Understanding;
- Advanced Neural Networks (Hopfield, Kohonen networks);
- Support Vector Machines;

Method of Assessment: Examination: (75%) Assignment: (25%)

Duration of Examination: 3 Hrs

For re-sit sessions, Assignment component is not re-sittable, Therefore, originally obtained mark for this component will be retained.

Textbooks:

- T Mitchell. *Machine Learning*, McGraw Hill.
- Michael Negnevitsky, *Artificial Intelligence: A Guide to Intelligent Systems*, Addison Wesley, ISBN 0-201-71159-1.
- Darlington Keith, *The Essence of Expert Systems*, Prentice Hall.
- Course notes and WWW links.

CSA3221 - Semantic Technologies for the Web

Study Unit Coordinator:	Dr. Matthew Montebello
Other Lecturer(s):	Mr. Charlie Abela
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	6 Hrs
Lectures:	36 Hrs
Level:	3

The current Web has experienced tremendous changes to connect information, people and knowledge. This is the aim behind the Semantic Web, which is also being referred to as Web 3.0 and which is heavily embedded in the Artificial Intelligence area. Its long-term goal is that of enhancing the human and machine interaction by representing the data in an understandable way for the machine to mediate data and services.

This first part of the course will provide an introduction to Knowledge Representation, since this is an important component of Artificial Intelligence and provides the fundamentals for the various Semantic Web languages. In this part we will give an overview of various Knowledge Representation schemes.

The second part of the course will focus on Ontology, since this is the backbone of the Semantic Web. It models the semantics of the data and represents them in markup languages. Semantically enriched data paves the crucial way to facilitate Web functionality and interoperability. This part will specifically deal with ontology-engineering and surveys the most popular ontologies, such as FOAF, SIOC and others. A number of ontology related languages, such as RDF, RDFS and OWL and their use in various applications will be considered.

The third part of the course will focus on agent technology since it is at the centre of automated intelligent software that acts on behalf and in the interest of the user. The Semantic Web is the ideal playground for such technologies that elicit the use of Web Services and Architectures supporting this service-oriented paradigm. Topics that will be covered include:

- Basic Intelligent Software & Artificial Life
- Agents communication languages and standards
- Agent Applications, Semantic Web & Web Services
- Virtual Worlds & Future Directions

Method of Assessment: Examination: (60%) Assignment: (40%)

Duration of Examination: 3 Hrs

Textbooks:

- Knowledge Representation: Logical, Philosophical, and Computational Foundations, John Sowa, (ISBN-13: 978-0534949655).
- Foundations of Semantic Web Technologies, Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph (ISBN: 978-1-4200-9059-5).
- Agency and the Semantic Web, Christopher Walton, ISBN-13: 978-0199292486.
- Artificial Intelligence: A Modern Approach, 3rd Edition, Stuart Russell, Peter Norvig (ISBN-13: 978-0-13-604259-4).

Supplimentary:

- Knowledge Representation and Reasoning, Brachman & Levesque (ISBN-13:978-1-55860-932-7).
- A Semantic Web Primer, 2nd Edition, Grigoris Antoniou and Frank van Harmelen, (ISBN-13: 978-0-262-01242-3).
- Ontological Engineering: Advanced Information and Knowledge Processing, Gomez-Perez, A., M. Fernandez-Lopez, and O. Corcho. 2003, Berlin: Springer (ISBN: 978-1-85233-551-9).

CSA5006 - Logic, Representation and Inference

Study-Unit Coordinator:	Mr. Michael Rosner
Other Lecturer(s):	Dr. Patrick Blackburn
ECTS Credits:	4 ECTS
Study-Unit Mode:	Compulsory for Year 1, Elective for Year 2
Semester:	2
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

This course introduces techniques for tackling the following issues:

- What is semantic representation?
- What is the relationship between semantic representation and logic?
- What mechanisms are required to associate semantic representations with expressions of natural language?
- How can we use logical representations of natural language expressions to automate the process of drawing inferences?

We will approach them by developing program modules that handle the key concepts of representation and inference including.

- First Order Logic
- Lambda Calculus
- Underspecified Representations
- Propositional Inference
- First Order Inference

Method of Assessment: Examination (75%) Assignment (25%)

Textbooks:

- Patrick Blackburn and Johan Bos, Representation and Inference for Natural Language, Stanford: CSLI Publications, 2005

CSA5008 - Introduction to Bioinformatics

Study-Unit Coordinator:	Dr. John Abela
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

This course deals with the storage, processing, retrieval, analysis, and understanding of biological information. This information is usually protein or DNA sequences. This aim of the course is to show that analysis of these sequences leads to a much fuller understanding of many biological processes allowing drug designers, scientists, pharmaceutical and biotechnology companies to determine, for example, new drug targets or to predict of a particular drug is applicable to all patients. Students will be introduced to the basic concepts behind Bioinformatics and Computational Biology tools

The first part of the course deals with string processing and analysis algorithms. Topics covered include:

- Formal Languages;
- String edit distance;
- Suffix trees;
- Multiple string comparison;
- Indexing;
- String searching;
- String Matching.

The second part of the course deals with applying the above algorithms in Bioinformatics. Topics covered include:

- Protein and DNA sequences;
- Alignment algorithms;
- Sequence classification;
- AI techniques applied to sequence analysis;
- The protein folding prediction problem.

Method of Assessment: Examination: (70%) Assignment: (30%)

Duration of Examination: 3 Hrs

Textbooks:

- Algorithms on Strings, Trees, and Sequences. Dan Gusfield.
- Protein Bioinformatics: An Algorithmic Approach to Sequence and Structure Analysis. Eidhammer, Jonassen, and Taylor.

CSA5011 - Corpora and Statistical Methods

Study-Unit Coordinator:	Dr. Albert Gatt
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

Aims

This course provides a grounding in (i) foundational statistical methods, especially probability, information theory, and statistical inference and (ii) corpus design, annotation and construction and the use of these to:

- Conduct linguistic research, whose aim is to Examination empirical hypotheses about language and make generalisations;
- Build Natural Language Processing systems (e.g. parsers, thesauri, generators) which differ from traditional rule-based or "symbol-processing" systems in that their core is a statistical language model derived from corpus data.

Syllabus

This course will be divided into three parts.

Part I deals with introductory material and some of the mathematical background. An important aspect of this is to provide students with exposure to existing corpora and also existing tools for corpus-based research, corpus building, and corpus annotation. Another important aspect is the use of the web as corpus.

Part II focuses in detail on particular areas of corpus-based research in NLP, and the methods used including

- Research on words, word distributions, word frequencies and collocations
- Semantic similarity and corpus-derived thesauri
- N-gram language models for parsers and generators.
- Machine-learning techniques (both statistical and "rule-based", where the latter involves the class of rule learners that infer symbolic/production rules from annotated corpora).

Part III aims to provide a more comprehensive picture of state-of-the art NLP research using corpora including

- Statistical Parsing: An overview of recent work in this area, covering TAG Grammars and the RASP parser (Carroll et al); parsers trained on treebanks (Charniak, Collins).
- Statistical Generation: This will mainly cover statistical language realisers, which take as input a semantic form, and output a natural language expression. Recent work in this area includes the overgeneration-and-ranking approach (Knight, Langkilde-Geary, Varges). Some recent work that applies statistical techniques to less "surface-oriented" issues (including content determination for NLG systems)

Method of Assessment: Examination: (85%) Assignment: (15%)

For re-sit sessions, Assignment component is not re-sittable, Therefore, originally obtained mark for this component will be retained.

Duration of Examination: 3 Hrs

Textbooks:

- Key Papers by Carroll, Charniak, Collins, Knight, Lankilde-Geary, Varges

CSA5012 - Fundamentals of Data Structures and Algorithms

Study-Unit Coordinator:	Dr. John Abela
Other Lecturer(s):	Mr. Kristian Guillaumier
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

This unit aims to introduce the concepts of algorithm and data structure, highlighting the relation that exists between the two. The concepts are introduced in a gradual fashion, proceeding from abstract principles to concrete examples. Correctness and efficiency will be emphasized as the main properties of algorithms. A number of algorithms will be discussed, with emphasis on sorting and searching. Abstract data types (ADTs) will be formally defined and illustrated with case studies for list, stack, queue, priority queues and heaps, and the ADT table. Finally, the structure of binary trees and the associated algorithms will be investigated.

Method of Assessment: Examination: (80%) Assignment: (20%)

Duration of Examination: 3 Hrs

Textbooks:

- Mark Allen Weiss, *Data Structures and Algorithm Analysis*, Benjamin Cummings
- D Harel, *Algorithmics: The Spirit of Computing*, Addison-Wesley
- Cormen, Leiserson, Rivest, *Introduction to Algorithms*, McGraw Hill.

CSA5013 - Imperative Programming and Object Orientation in Java

Study-Unit Coordinator:	Mr. Andrew Calafato
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	20 Hrs
Lectures:	42 Hrs
Level:	5

This course focuses on both the Imperative and the Object-Oriented programming paradigms using the Java language as an example language. The first part introduces the imperative aspects of a language, focusing on memory management and discusses how references are handled in the Java Language.

The second part of the course deals with the OO paradigm. The basic concepts of inheritance, encapsulation and polymorphism are covered together with more advanced concepts such as the use of Generics for typing of Collections and some Design Patterns. The rest of the course takes into consideration various Java APIs to demonstrate how Objects can be used to model various requirements – in particular the course covers APIs such as Threads (java.lang.Thread), Input and Output (java.io.*), Graphical user interfaces and events (javax.Swing), Collections and unit testing with JUnit. The course includes also a number of tutorial sessions in the labs.

Method of Assessment: Examination: (60%) Assignment: (40%)

Duration of Examination: 2 Hrs

Textbooks:

- Introduction to Java Programming-Comprehensive Version- 6th Edition – Y. Daniel Liang (ISBN: 0-13-222158-6)
- Introduction to Programming and Object Oriented Design using Java, 3rd Edition, J. Nino & F.A. Hosch, (ISBN: 978-0-470-12872-8).
- Object Oriented Analysis and Design – Grady Booch (Addison Wesley).

CSA5014 - Fundamental Concepts of Web Science

Study-Unit Coordinator:	Dr. Alexiei Dingli
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	8 Hrs
Lectures:	34 Hrs
Level:	5

Web Science (WS) is a new interdisciplinary field created to understand, engineer and exploit the largest information construct created by men, the Internet. This introductory course is divided into three main parts.

- The first part will explore the differences between the World Wide Web (WWW), Web 2.0 and Web X.0 (the Semantic Web). The topics covered will include Knowledge Management, the knowledge life cycle and various Semantic Web applications in order to taste the future of the Web.

- The second part will deal with the building blocks of the Semantic Web, namely the eXtensible Markup Language (XML). The topics covered will also include other XML related technologies (such as DTDs, XML Schemas, XPath, XQuery, XSLT, FOP, XLink and XForm).

- The third part of the course will provide an introduction to Ruby on Rails and related Technologies.

At the end of the course students should have a good understanding of the Web and related technologies and they should be well equipped to engineer the next generation of the Web.

Method of Assessment: Assignment: (100%)

Textbooks:

- An Introduction to XML and Web Technologies, Anders Møller and Michael I. Schwartzbach, ISBN: 0321269667.
- Knowledge Representation and Reasoning, Brachman & Levesque (ISBN-13: 978-1-55860-932-7).
- Knowledge Representation, John Sowa, (ISBN-13: 978-0534949655).
- Various online resources.

CSA5015 - Fundamentals of Discrete Mathematics

Study-Unit Coordinator:	Dr. Gordon Pace
Other Lecturer(s):	Mr. Christian Colombo
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1 & 2
Tutorials / Practicals:	4 Hrs
Lectures:	38 Hrs
Level:	5

The course is primarily aimed to introduce the basic mathematical tools that are required for the formal and rigorous treatment of the various aspects of computing. The importance of formal reasoning is emphasised in the course, concentrating on syntax, and formal proofs.

Syllabus:

- Propositional Calculus;
- Predicate Calculus;
- Set theory;
- Relations and Functions;
- Natural Numbers and cardinality;
- Group theory;
- Graph theory.

This unit is also intended to introduce the concept of logic as a tool for studying the validity of arguments.

Topics include an introduction to:

- Predicate and propositional logic.
- Logical equivalence and satisfiability.
- The syntax of First Order Logic.
- Axioms and inference rules.
- Proof systems and techniques.
- Set theory;
- Principle of Induction;
- Natural Numbers:;
- Cardinality;
- Structured Types.

Method of Assessment: Examination Semester 1: (30%) Examination Semester 2: (70%)

Duration of Examination: 2 Hrs (Per Exam)

For Resit sessions, the examination mark obtained in Semester 1 i.e. the 30%, will be retained. The Resit will be in the form of an exam covering ONLY the remaining 70%. This Resit method is being applied as per new Resit assessment regulations (Reg. 54).

Textbooks:

- Andrew Simpson, Discrete Mathematics by example, McGraw-Hill.

CSA5016 - Logic Programming

Study-Unit Coordinator:	Dr. Matthew Montebello
ECTS Credits:	3 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	21 Hrs
Level:	5

This course pursues the theme of logic programming by offering a comprehensive introduction to the syntax, semantics and features of Prolog, a well-known logic programming language that has been used extensively in a wide variety of AI application areas. The approach will be organized around a series of carefully chosen laboratory exercises.

Method of Assessment: Examination: (80%) Assignment: (20%)

Duration of Examination: 2 Hrs

For re-sit sessions, Assignment component is not re-sittable, Therefore, originally obtained mark for this component will be retained.

Textbooks:

- Sterling and E. Shapiro. *The Art of Prolog (2nd Edition)*. MIT Press 1994. ISBN 0-262-19338-8.
- Callear D. *Prolog Programming for Students*. DP PULL. 1994 ISBN 1-85805-093-6.
- **Website:**
  http://vle.um.edu.mt

Study-Unit Coordinator:	Mr. Joseph Cordina
ECTS Credits:	3 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	Multiple sessions in groups of students
Lectures:	14 Hrs
Level:	5

This course gives an introduction to the functional programming paradigm, using Haskell. The course will start off with an introduction to Lambda Calculus. The course will then cover notions such as currying, strong typing, pattern matching, higher-order functions and advanced functional data types using practical examples. Evaluation order is discussed to explain the difference between call-by-value and call-by-name strategies, concentrating on lazy evaluation, the strategy used in Haskell. The practical part of the course finishes with an overview of type classes and examples of their use. The course will be complemented by a number of practical sessions, in which you will discuss exercises that were handed out the week before.

Aims of the Course:

To present Functional Programming as an alternative paradigm which fosters a mathematical reusable approach towards programming, as also to appreciate the benefits of a strongly type language.

Topics Covered:

- Introduction to Lambda Calculus;
- Introduction: Notation, Currying, Basic Types, Pattern Matching, Referential Transparency;
- Lists and Tuples;
- Higher-Order Functions;
- Advanced Types: Enumerated types, parametrised types, data VS type;
- Type Classes;
- Embedded Languages;
- Evaluation Order and Lazyness;

Method of Assessment: Examination: (70%) Assignment: (30%)

Duration of Examination: 2 Hrs

Textbooks:

- Simon Thompson, *The Craft of Functional Programming*, Addison-Wesley, ISBN: 0201342758.
- Richard Bird, *Introduction to Functional Programming using Haskell*, Prentice Hall Series in Computer Science, ISBN 0-13-484346-0, 1998.
- Paul Hudak, *The Haskell School of Expression: Learning Functional Programming through Multimedia*, Cambridge University Press, ISBN 0-521-64408-9, 2000.

CSA5018 - Concepts of Artificial Intelligence

Study-Unit Coordinator(s):	Dr. John Abela & Dr. Matthew Montebello
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1 & 2
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

This credit aims to familiarize students with the nature of AI problems and related practical solution techniques. The module is divided into two parts, each of which includes practical Assignment.

Part I is concerned with fundamental issues and serves as an introduction to the subject, its goals, and the use of symbolic programming techniques. Topics include:

- AI over the years;
- Agent Technologies & Mark-up languages;
- Problem solving, Semantics & Ontologies;
- Searching & Semantic Web;
- Game Playing & Knowledge Representation;
- Expert Systems.

Part II is oriented towards the following topics:

- Search and Optimization problems;
- Function Approximation problems (i.e. Function Learning and Synthesis);
- ANNs (theory, architecture, design, and implementation);
- Genetic and Evolutionary Algorithms (background, design, and implementation);
- Montecarlo Techniques applied to Search and Optimization problems;
- Artificial Life;
- WISARD neural network for scene analysis.

The emphasis will be on the design and implementation of programs that solve various search, optimization, and function approximation problems using Neural Networks, Genetic Algorithms, and the Montecarlo random search technique.

Problems discussed include: OCR, machine vision, speech recognition, scheduling, pattern recognition, and some NP Hard problems.

Method of Assessment: Examination: (75%) Assignment: (25%)

Textbooks (Part 1):

- Russell and P Norvig. *Artificial Intelligence, a Modern Approach.* Prentice Hall, 1994. ISBN 0-13-103805-2.
- Yoav Shoham. *Artificial Intelligence Techniques in Prolog.* Morgan Kaufmann ISBN 1-55860-167-8.
- Bratko, Prolog Programming for AI, 1994, Addison Wesley, ISBN 0-201-41606-9.
- **Website:**
  http://vle.um.edu.mt
- Baeza-Yates, Ricardo. Ribeiro-Neto, Berthier. 1999. Modern Information Retrieval. Addison Wesley, New York
- Brin, Sergey. Page, Lawrence. 1998. "The Anatomy of a Large-Scale Hypertextual Web Search Engine". Stanford University, California.

Textbooks (Part 2):

- David E. Goldberg, *Genetic Algorithms in Search, Optimization, and Machine Learning*.
- Michael Negnevitsky, *Artificial Intelligence: A Guide to Intelligent Systems*, Addison Wesley, ISBN 0-201-71159-1
- Course notes and handouts will also be provided by the Study Unit Coordinator for part II

Module 1: Formal Languages

Module Coordinator:	Dr. Adrian Francalanza
ECTS Credits:	3 (of 6 ECTS)
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	21 Hrs
Level:	5

This module will be covered during Semester 1 and deals with the formal treatment of languages and automata (or machines) to recognize languages. The aims are not only at instilling the basic notions of languages, grammars and automata using formal mathematical notation but also provides a practical perspective, by applying the mathematical results to design parsers.

Syllabus:

- Formal languages and grammars.
- Regular languages: regular grammars, finite-state automata, regular expressions.
- Context-free languages: context-free grammars, pushdown automata.
- Closure properties of regular and context-free languages.
- Normal forms for grammars.
- Recognition algorithms for grammars.

The theory explored in the course will also be presented from a practical perspective, and a background in declarative functional programming will be assumed. The constructions used in the proofs covered in the course will also be expressed as programs, introducing the concept of provably correct algorithms.

Level:

The course is aimed at 2nd year students in the second semester, building upon the material covered in Mathematics of Discrete Structures and Functional Programming.

Method of Assessment: Examination in Semester 1: (40%) Assignment in Semester 1: (10%)

Duration of Examination: 2 Hrs

Textbooks:

- An Introduction to Formal Langauges and Automata, Peter Linz, Jones and Bartlett Publishers, 2006.
- An Introduction to the Theory of Computation, Michael Sipser, PWS Publishing, 1997.
- A First Course in Formal Language Theory, V.J. Rayward-Smith, McGraw Hill, 1995.

Module 2: Compilers

Module Coordinator:	Mr. Sandro Spina
ECTS Credits:	3 (of 6 ECTS)
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	21 Hrs
Level:	5

This module will be covered during Semester 2. This part is an advanced compiler theory course which concerns itself mainly with the building of efficient and correct compilers. We'll see how many of the algorithms used in formal language theory are utilized in compiler writing. The aim of this course is to give students a solid theoretical and practical understanding of how to build a compiler.

The following topics (amongst others which we might deem important at the time of delivering the course) are covered:

- Lexical Analysis;
- Syntax Analysis;
- Type Checking;
- Code Generation and Optimisation.

Method of Assessment: Examination in Semester 2: (35%) Assignment in Semester 2: (15%)

Duration of Examination: 2 Hrs

Textbooks:

- Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman Compilers – Principles, Techniques and Tools (2nd Edition).

***Failing study unit – A pass in this study unit is COMPULSORY.**

Study-Unit Coordinator:	Dr. John Abela
Other Lecturer(s):	Mr. Kristian Guillaumier & Mr. Angelo Dalli
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

In this unit the fundamental algorithms discussed in CSA5012, will be treated with a formal analysis of their efficiency. The unit will also introduce more advanced data structures and the associated algorithms. Topics covered are: graphs and their associated searching and traversal algorithms, hashing techniques, statistical algorithms, indexing algorithms, string algorithms, cryptography, dynamic programming, and game playing. Additional topics related to search technology will be introduced including: basic IR concepts, boolean, vector, probabilistic and fuzzy ranking models, evaluation of results: precision and recall, TF.IDF.

Method of Assessment: Examination: (80%) Assignment: (20%)

Duration of Examination: 3 Hrs

Textbooks:

- Mark Allen Weiss, *Data Structures and Algorithm Analysis*, Benjamin Cummings
- V Aho, J E Hopcroft, J D Ullman, *Data Structures and Algorithms.*
- Cormen, Leiserson, Rivest, *Introduction to Algorithms*, McGraw Hill.

CSA5021 - Concepts and Systems for Adaptive Hypertext

Study-Unit Coordinator:	Dr. Christopher Staff
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	42 Hrs
Level:	5

User-Adaptive Systems are systems that are able to discover, represent, and manipulate, user interests and requirements as users navigate and search through an information space, and then adapt the organisation of and the presentation of information accordingly. This study-unit explores the history of user-adaptive systems and delves into essential components of user-adaptive systems: user modelling, information and knowledge representation, adaptation techniques, intelligent tutoring systems and hypertext systems.

Method of Assessment: Examination: (100%)

Duration of Examination: 3 Hrs

Main textbooks (recommended):

- Baeza-Yates, R., and Ribeiro-Neto, B. (1999). Modern Information Retrieval. Addison-Wesley.
- Brusilovsky, P. (1996) Methods and techniques of adaptive hypermedia. In *User Modeling and User-Adapted Interaction*, 6 (2-3), pp. 87-129. Available on-line at: http://www.contrib.andrew.cmu.edu/~plb/UMUAI.ps
- Berners-Lee, T., Hendler, J., and Lassila, O. (2001), The Semantic Web. In *Scientific American*, May 2001. Available on-line at: http://www.scientificamerican.com/issue.cfm?issuedate=May-01
- Balasubramanian, V. (1994). A State of the Art Review on Hypermedia Issues and Applications. Available on-line at http://citeseer.nj.nec.com/balasubramanian94state.html.
- **Website:** http://staff.um.edu.mt/csta1/courses/lectures/csa3212.

CSA5024 - Advanced Issues in LCT 1

Study-Unit Coordinator:	Various
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	1
Contact Hours:	28 Hrs
Level:	5

Language and Communication Technology is a broad area that encompasses a large number of specialist sub-areas. The International Consortium of universities participating in the Erasmus Mundus LCT programme includes a number of world-renowned practitioners in these areas. This study unit aims to give the student the opportunity to explore an advanced area of study in Language and Communication Technology which takes full advantage of the mobility of potential for scholars (lecturers) offered by the Erasmus Mundus and other programmes.

In order to reduce the time commitment of invited lecturers to manageable proportions, instances of this unit will normally be delivered in less than the full duration of a semester. Typically, the unit will be organised as a series of seminars together with laboratory sessions if this is appropriate for the subject at hand.

Assessment will be in the form of a written assignment which may include a programming component.

Method of Assessment: Assignment: (100%)

CSA5025 - Advanced Issues in LCT 2

Study-Unit Coordinator:	Various
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	2
Contact Hours:	28 Hrs
Level:	5

Language and Communication Technology is a broad area that encompasses a large number of specialist sub-areas. The International Consortium of universities participating in the Erasmus Mundus LCT programme includes a number of world-renowned practitioners in these areas. This study unit aims to give the student the opportunity to explore an advanced area of study in Language and Communication Technology which takes full advantage of the mobility of potential for scholars (lecturers) offered by the Erasmus Mundus and other programmes.

In order to reduce the time commitment of invited lecturers to manageable proportions, instances of this unit will normally be delivered in less than the full duration of a semester. Typically, the unit will be organised as a series of seminars together with laboratory sessions if this is appropriate for the subject at hand.

Assessment will be in the form of a written assignment which may include a programming component.

Method of Assessment: Assignment: (100%)

CSA5026 - Language Technology for the Web

Study-Unit Coordinator:	Prof. Paola Monachesi
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	14 Hrs
Lectures:	14 Hrs
Level:	5

In this unit, we will investigate which tools and technologies are currently available to achieve human-machine content co-creation, and what are their limitations. We will analyze how Language Technology and Natural Language Processing techniques contribute to information extraction and eventually from the web and its reuse.

The role that tagging (i.e. keywords used to describe the resources contributed by users in social media applications) is gaining in the Social Web will be addressed. We will analyze various algorithms that can be employed to extract structured information from tags leading to a categorization of knowledge that takes users into account. More specifically, we will focus on how the application of Semantic Web technologies, such as ontologies, to the Social Web is leading towards the Social Semantic Web, in which users, resources and knowledge are closely interlinked.

Method of Assessment:	Assignment: (50%)	Classwork: (10%)
	Project: (30%)	Presentation: (10%)

Textbooks:

- Breslin, J. G., Passant, A., Decker, S. "The Social Semantic Web". Springer Verlag (2010).
- several articles for the Language Technology applications to the Semantic Web and Social Web.

CSA5028 - Finite State Machinery and Computational Morphology

Study Unit Coordinator:	TBA
ECTS Credits:	6 ECTS
Study-Unit Mode:	Compulsory for Year 1, Elective for Year 2
Semester:	1 & 2
Tutorials / Practicals:	14 Hrs
Lectures:	28 Hrs
Level:	5

Linguistic Morphology studies the internal structure of words. The main issues that have to be considered are (a) how a word is segmented into its component parts, (b) which parts are common to different forms of the same word and (c) how the parts interact with each other to define the particular nature of a given wordform. Computational morphology attempts to shed light on these issues by building computational models. For the most part these models are based on Finite State Automata of different kinds.

The course is divided into two parts.The first part tackles the linguistic background dealing with the core phenomena of inflection, derivation, compounding, and clitics. Different languages will be looked at, including Maltese. Some related issues such as the lexicon and POS tags will also be discussed.

The second part of the course looks at some of the computational issues concerned with morphological analysis and generation. The use of various toolkits will be illustrated. In addition, some other issues will be looked including how machine learning techniques can be be applied to the problem of acquiring morphology automatically.

There are two assignments associated with this course. The first will be mainly decriptive, involving the description of the morphology of a particular language. The second will involve the creation of an analyser/generator for the chosen language.

Use will be made of Xerox technologies such as xfst and lexc toolbox developed at Stanford by Lauri Karttunen, Ken Beesley. If there is time other technologies will be looked at such as Goldsmith's Linguistica. Approaches to the lexicon will also be discussed in particular with reference to morphological analysis and generation.

Method of Assessment: Assignment: (100%)

Textbooks:

- Spencer, Andrew and Zwicky, Arnold M. (Eds.) (1998). The handbook of morphology. Blackwell handbooks in linguistics. Oxford: Blackwell. ISBN 0-631-18544-5.
- Monachesi, P. (2005) The Verbal Complex in Romance. OUP. Ch. 3.
- Sproat, R.W. (1992). Morphology and Computation. MIT Press, Cambridge, MA.
- K.Beesley and L. Karttunen (2003), Finite State Morphology, Stanford:CLSI Publications

Articles:

- Lauri Karttunen, Kimmo Koskenniemi, Gertjan van Noord. Special issue: Finite State Methods in Natural Language Processing. Natural Language Engineering. Volume 9, Part 1, March 2003.

CSA5029 - Ambient and Mobile Intelligence

Study-Unit Coordinator:	Dr. Matthew Montebello
Other Lecturer(s):	Dr. Alexiei Dingli
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Lectures:	42 Hrs
Tutorials / Practicals:	None
Level:	5

This study unit will be divided into four sections namely:

- Part A: AI & Agent Technology Theoretical issues related to the area of AI and Agents will form as a basis for the next sub-sections.
- Part B: Pervasive & Semantic Web The ubiquitous second generation web is introduced to set the scene for the new cutting-edge technologies.
- Part C: Wireless & Portable Technologies Popular and widely employed technologies are introduced to complete the setting of the scene of how such technologies will be applied with technologies in Part B.
- Part D: Practical & Applicable Issues Applying the theories and technologies introduced in Part B and C come together to give a practical aspect to the credit.

Method of Assessment: Examination: (60%) Assignment: (40%)

Textbooks:

- Agency and the Semantic Web Christopher Walton OUP Oxford ISBN 978-0199292486.
- Mobile Web Services Ariel Pashtan Cambridge University Press 978-0521830492.
- Lecture Notes available on VLE.

CSA5310 - M.Sc. HLST Dissertation

Study-Unit Coordinator(s):	Various
ECTS Credits:	30 ECTS
Study-Unit Mode:	Compulsory for Year 2
Semester:	1 & 2
Contact Hours:	0
Level:	5

The Course shall be offered in areas of study in which expert guidance and supervision is available and subject to resources as determined by the Departments of Computer Science and Intelligent Computer Systems and the Institute of Linguistics. The areas of study shall be agreed with the Board of Studies at the outset of the Course.

Students are required to write a dissertation based on work of an advanced or original nature carried out during the course. Students will also be required to present their findings and conclusions orally in the form of a scholarly seminar.

Method of Assessment: Dissertation + Presentation + Oral Exam: (100%)

If failing to pass and with the recommendations of the external examiner and the panel of supervision assigned, students will be allowed to re-submit their dissertation. In such case, the maximum grade that may be awarded shall be grade D, and the originally obtained marks for the Presentation & Oral Exam will be retained.

CSA5311 - Seminar Presentation

Study-Unit Coordinator(s):	Dr. Ray Fabri & Mr. Michael Rosner
ECTS Credits:	4 ECTS
Study-Unit Mode:	Compulsory
Semester:	1
Contact Hours:	28 Hrs
Level:	5

This study unit aims to give the student the opportunity to research in depth and deliver a critical analysis of a specialized topic. In the process, the unit should enhance the student's ability to research and report in a professional scientific manner. A choice of topics will be offered by lecturers to the students.

Students taking the unit will be assigned a topic, accompanied by a series of readings by the lecturer. It is expected that the student will research the area by studying the given material, supported by additional papers and books that the student is expected to discover as part of his or her research. Regular meetings with the student's supervisor will ensure that the research is duly carried out.

At the end of the unit, the student will be expected to submit a detailed and professional scientific report, which should take the form of a literature review. Furthermore, the student is also expected to deliver a presentation of his or her findings.

Method of Assessment: Assignment: (75%) Presentation: (25%)

CSA5312 - HLST Project

Study-Unit Coordinator(s):	Various
ECTS Credits:	10 ECTS
Study-Unit Mode:	Compulsory for Year 1, Elective for Year 2
Semester:	2
Level:	5

Students will be introduced to a problem in a given area by a series of lectures and seminars. They are expected to produce a solution to the problem (i) an artifact such as a working program, a proof, a description of a process or relation, or a framework / methodology (ii) a report, up to 10,000 words in length, containing a comprehensive written account of the task as carried out, including background (with a literature survey where appropriate), objectives, chosen approach, description of the artifact (with relevant documentation in the case of a working program), conclusions and bibliography, and (iii) a presentation of duration 10 mins in which to present the work undertaken before an audience including the supervisor and examiner.

Where feasible, the HLST project will be carried out by a group. It is suggested that the group size should be not less than three and not more than four students. Teams of five students may be considered in extraordinary cases depending on the project's nature. The team should have a "leader" who will act as an internal rallying point and an external liaison. The responsibilities of the "leader" are set at the discretion of the lecturer who is supervising the Project.

Method of Assessment: Project: (85%) Presentation: (15%)

Students will be allowed to re-sit their HLST Project. In this re-sit, they will be allowed to re-submit their HLST Project write-up and to redo the presentation. In this case, the maximum grade that may be awarded shall be grade D.

Website:

- http://www.um.edu.mt/ict/links/year_2_group_apt_day

LIN5070 - Fundamentals of Morphology and Syntax

Study-Unit Coordinator:	Dr. Ray Fabri
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	1 & 2
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

Learning Objectives

The main components of grammar are morphology and syntax. Morphology deals with word formation, while syntax deals with the structure of phrases and sentences. Students are expected to become familiar with fundamental concepts, such as 'word' and 'phrase structure', and to consolidate this basic knowledge by discussing examples from various languages.

Content Covered

Fundamental concepts and analytical tools are introduced first, followed by a discussion of specific morphological and syntactic phenomena, including, among others, inflection, derivation and compounding in morphology, and word order, case, agreement and the active/passive construction in syntax.

Method of Assessment: Examination (100%)

Textbooks:

- Borsley, R. D. 1991. *Syntactic Theory: a unified approach.* London: Arnold.
- Brown, K. and Jim Miller 1992 *Syntax: a linguistic introduction to sentence structure*. (2nd edition) London: Routledge.
- Haspelmath, M. 2002. *Understanding Morphology.* London: Arnold.
- Matthews, P. H. 1984. *Syntax.* Cambridge: Cambridge University Press.
- Matthews, P. H. 1991. *Morphology.* (2nd edition) Cambridge: Cambridge University Press.
- Radford, A. 1988. *Transformational Grammar*. Cambridge: Cambridge University Press.
- Radford, A. 1997. *Syntax: a minimalist introduction*. Cambridge: Cambridge University Press.
- Spencer, A. 1991. *Morphological Theory.* Cambridge: Basil Blackwell.

LIN5090 - Issues in General Phonetics

Study-Unit Coordinator:	Dr. Marie Alexander
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	1 & 2
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

Learning Objectives

The student will become familiar with the elements of speech production. The course constitutes a foundation for other Phonetics and linguistics courses. By the end of the course the student will be expected to use the terminology of articulatory phonetics fluently. The student is expected to apply the principles of Phonetics to discriminate between (as well as to produce) sounds used in different human languages and to transcribe using the IPA.

Content Covered

The course deals with the following elements of speech production: (i) airstream mechanisms; (ii) phonation; (iii) articulation and (iv) co-ordination. The IPA will be used throughout the consideration of the phonetic analysis of speech which constitutes the major part of the course.

Practical Sessions are held for ear training and performance production. The student is expected to apply what he has learned about the elements of speech in the theoretical part of the course. It includes training to discriminate between sounds made with different airstream mechanisms, different kinds and degrees of stricture and at different places of articulation as well as different phonation types. The student is given the opportunity to explore the use of his own vocal apparatus in producing sounds that are not a part of the inventory of his own native language but which are produced by other language communities elsewhere in the world.

Method of Assessment: Examination: (100%)

Textbooks:

- Abercrombie, D. 1967. *Elements of General Phonetics.* Edinburgh: Edinburgh University Press.
- Ashby, M. & Maidment, J. 2005. *Introducing Phonetic Science*. Cambridge: Cambridge University Press.
- Catford, J. C. 1988. *A Practical Introduction to Phonetics.* Oxford: Clarendon Press.
- Ladefoged, P. 2001. *A Course in Phonetics* (2nd ed.) New York: Harcourt Brace Jovanovich.
- Laver, J. 1994. *Principles of Phonetics.* Cambridge: Cambridge University Press.

LIN5021 - Issues in Morphology and Syntax

Study-Unit Coordinator:	Dr. Ray Fabri
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

Part 1: Issues in Morphology (LIN5121 2 credits) can be taken separately

- Learning Objectives:

The aim of this course is to familiarise the student with current research within particular area of morphology. The student needs to have a good knowledge of basic notions and terms used in the study morphology. The student must also be prepared to adopt a critical stance towards the subject matter under discussion and to try and develop his/her own ideas.
Content Covered: A number of current studies on morphology are presented and discussed with a view to achieving an understanding of the problems involved and the solutions offered.
Part II Issues in Syntax: (LIN5221 2 credits) can be taken separately

- Learning Objectives:

This study-unit presupposes the knowledge in the module LIN5070. The aim of this course is to familiarise the student with current research within particular area of syntax. The student needs to have a good knowledge of basic notions and terms used in the study syntax. The student must also be prepared to adopt a critical stance towards the subject matter under discussion and to try and develop his/her own ideas.
Content Covered: A number of current studies on syntax are presented and discussed with a view to achieving an understanding of the problems involved and the solutions offered.

Method of Assessment: Examination: (50%) Presentation: (50%)

Textbooks:

- Chomsky, N. 1995. *The Minimalist Program.*Massachusetts: MIT Press.
- Jackendoff, R. 1993. *Patterns in the Mind.* London: Harverster Wheatsheaf .
- Matthews, P. H. 1974. *Morphology*. Cambridge: Cambridge University Press.
- Napoli, D. J. 1993. *Syntax: Theory and Problems*. Oxford: Oxford University Press.
- Sells, P. 1985. *Lectures on Contemporary Syntactic Theories: An Introduction to Government-Binding Theory, Generalized Phrase Structure Grammar, and Lexical-Functional Grammar.* Stanford: CSLI.
- Spencer, A. 1991. *Morphological Theory*. Cambridge, Mass.: Blackwell.

LIN5022 - Grammar Models

Study-Unit Coordinator:	Dr. Ray Fabri
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

The aim of this course is to introduce students who understand the fundamental concepts of Linguistics to the notion of formal model of grammar and to familiarise them with various models of syntax (phrase/sentence structure) and morphology (word structure).

Content Covered:

The notion of a model is explored both from a historical and from a "present-day" perspective, with a focus on the latter. The former looks at the way in which the notion of grammar has been treated in different historical phases and by different scholars and schools of thought; the latter looks both at current models of grammar, both generative and non-generative.

Method of Assessment: Assignment: (100%)

Textbooks:

- Chomsky, Noam. 1957. *Syntactic Structures*. The Hague: Mouton.
- Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, Mass.: MIT Press.
- Fabri, Ray. 1998. Models of Inflection. In: R. Fabri, A. Ortmann, & T. Parodi (eds.) *Models of Inflection*. Tübingen: Niemeyer, pp. 1- 10.
- Jackendoff, Ray. 2002. *Foundations of Language.* Oxford: Oxford University Press.
- Newmeyer, Fredrick. 1983. *Grammatical Theory*: *Its Limits and its Possibilities*. Chicago: University of Chicago Press.
- Radford, Andrew 1997. *Syntax: A Minimalist Introduction*. Cambridge: Cambridge University Press.
- Sells, Peter 1985. *Lectures on Contemporary Syntactic Theories: An Introduction to Government-Binding Theory, Generalized Phrase Structure Grammar, and Lexical-Functional Grammar.* Stanford: CSLI.
- Spencer, Andrew. 1991. *Morphological Theory*. Cambridge, Mass.: Blackwell.

LIN5082 - Semantics for Language Technology

Study-Unit Coordinator:	Dr. Albert Gatt
ECTS Credits:	2 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	TBA
Lectures:	14 Hrs
Level:	5

Learning objectives

Participants will be familiarised with the basic concerns, concepts, and terminology of linguistic semantics, and exercised in the description and analysis of both lexical and propositional meaning.

Content Covered

This introductory course is concerned with two basic questions:

1. *What is meaning?*
2. *How can linguistic theory account for a speaker's knowledge of the meaning of natural language utterances?*

These questions have been tackled within a variety of disciplines in addition to linguistics, especially philosphy and psychology. Therefore, the course will involve forays into both these disciplines, while maintaining a clear focus on semantic theorising within the discipline of linguistics itself. The course will proceed in the following stages:

1. A historical overview of different approaches to the analysis of meaning. This will include brief incursions into philosophical approaches (from Plato to Frege), with a view to tracing their impact on contemporary theories of linguistic semantics. This initial overview will help to contextualise the subsequent focus on major trends in contemporary semantic theory.

2. An introduction to the basic concepts of semantic theory, including sense, denotation and reference.

3. An introduction to lexical semantics, with a focus on:

    - Lexical fields and meaning relations such as synonymy and hyponymy;
    - Classical approaches to word meaning such as decompositional and definitional theories. This will also include an overview of contemporary descendants of these theories, such as Anna Wierzbicka's Natural Semantic Metalanguage, Ray Jackendoff's Conceptual Semantics, and James Pustejovsky's Generative Lexicon Theory.
    - The relationship between words, meanings and the world.

4. An introduction to propositional and sentence meaning, including:

    - The notion of compositionality;
    - Some of the fundamentals of propositional meaning such as truth conditions and entailment.
    - Some aspects of the relationship between syntax and semantics, particularly the issues of predication and argument structure (thematic roles) and selectional restrictions.

Data for analysis and exemplification will largely be drawn from Maltese and English.

During the course, students will be assigned tasks that will help them exercise the skills acquired during lectures. These tasks will involve both theoretical analysis of linguistic phenomena and the use of computational tools such as WordNet. The tasks will form part of the overall assessment.

Method of Assessment: Assignment: (85%) Classwork: (15%)

Textbooks:

- Saeed, J. 2003. *Semantics.* Oxford: Blackwell Publishers.
- Loebner, S. 2002. *Understanding Semantics.* London: Edward Arnold.
- Cruse, A. 2000. *Meaning in Language: an introduction to semantics and pragmatics.* Oxford: Oxford University Press.

Further reading:

- Wierzbicka, A. 1992. *Semantics, culture and cognition: Universal human concepts in culture-specific configuations.* Oxford: Oxford University Press.
- Jackendoff, R. 2002. Foundations of language: Brain, meaning, grammar and evolution. Oxford: Oxford University Press.
- Pustejovsky, J. 1995. *The generative lexicon.* Cambridge, Ma: MIT Press.

LIN5083 - Conversational Analysis

Study-Unit Coordinator:	Dr. Paul A. Falzon
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

The course is intended to consolidate postgraduate students' understanding of Interactional Linguistics by providing them with a thorough grounding in the analysis of conversation.

Conversation is fundamental to human communication. It serves both transactional and interpersonal ends and enables interlocutors to achieve shared understanding. The study-unit involves students in data collection, transcription and analysis.

Method of Assessment: Assignment: (100%)

Textbooks:

- Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press.
- Hutchby, I., & Wooffitt, R. (2008). *Conversation analysis* (2nd ed.). Cambridge: Polity Press.
- Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systemics for the organization of turn-taking for conversation. *Language, 50*: 696-735.
- Schegloff, E. A. (2007). *Sequence organisation in interaction: Vol 1. A primer in conversation analysis*. Cambridge: Cambridge University Press.
- Stenström, A. B. (1994). *An Introduction to spoken interaction*. London: Longman.
- Ten Have, P. (2007). *Doing conversation analysis: A practical guide* (2nd ed.). London: Sage.

LIN5084 - Pragmatics and Discourse Analysis

Study-Unit Coordinator:	Dr. Paul A. Falzon
ECTS Credits:	4 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	28 Hrs
Level:	5

The course is intended to consolidate postgraduate students' understanding of Interactional Linguistics by providing them with a thorough grounding in pragmatics and discourse analysis.

Interactional linguistics is the study of language as a communicative resource. When people communicate they produce discourse. The design of their discourse is reflexively related to pragmatic meaning. The study-unit brings critical attention to bear on essential notions in pragmatics and multiple approaches to the study of discourse.

Method of Assessment: Examination: (100%)

Textbooks:

- Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage*. Cambridge: Cambridge University Press.
- Cruse, A. (2004). *Meaning in language: An introduction to semantics and pragmatics* (2nd ed.). Oxford: Oxford University Press.
- Grundy, P. (2008). *Doing pragmatics* (3rd ed.). London: Edward Arnold.
- Johnstone, B. (2002). *Discourse analysis*. Oxford: Blackwell.
- Leech, G. (1983). *Principles of pragmatics*. London: Longman.
- Levinson, S. C. (1983). *Pragmatics*. Cambridge: Cambridge University Press.
- Schiffrin, D., Tannen, D., Hamilton, H. E. (Eds.). (2003). *The handbook of discourse analysis*. Malden, MA: Blackwell.
- Sperber, D., & Wilson, D. (1995). *Relevance: Communication and cognition* (2nd ed.). Oxford: Blackwell.
- Thomas, J. (1995). *Meaning in interaction: An introduction to pragmatics*. London: Longman.
- Van Dijk, T. A. (Ed.) (1997). *Discourse studies: A multidisciplinary introduction: Vol. 1. Discourse as structure and process*. Thousand Oaks, CA: Sage.
- Van Dijk, T.A. (Ed.) 1997. Discourse Studies: A Multidisciplinary Introduction; Vol. 2. Discourse as Social Interaction Thousand Oaks, CA; Sage.

ICT5001 - Mathematical and Programming Skills

Study-Unit Coordinator:	Dr. Matthew Montebello
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	1
Tutorials / Practicals:	None
Lectures:	35 Hrs
Level:	5

The purpose of the first part of this course is to give a full coverage of all the Mathematical topics that will be required throughout the MIT. These topics will be collated from the requirements from all the study-units throughout the 2 years including:

- Complex Numbers;
- Simultaneous Equations;
- Probability;
- Matrix manipulation;
- Differentiation;
- Integration.

Furthermore the second part of this course will introduce the basic programming skills using the OO paradigm with no reference to any specific language.

Method of Assessment: Assignment: (100%)

Textbooks:

- Course Notes

ICT5004 - Further Programming and ICT Applications Area

Study-Unit Coordinator:	Mr. Charlie Abela
Other Lecturer(s):	Dr. Matthew Montebello
ECTS Credits:	6 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	None
Lectures:	35 Hrs
Level:	5

The first part of this course will introduce the Java programming language as a first language giving the students first hand experience. This will include:

i. An Introduction to Java.
ii. Java Basic Building Blocks.
iii. Java Advanced Building Blocks.
iv. Conditional Statements.
v. Iterative Statements.
vi. The Class and Objects.
vii. Methods, encapsulation and static methods.
viii. Arrays and Strings.
ix. Inheritance and Polymorphism.
x. Exceptions.
xi. Streams and Files.
xii. Collections, DataStructures and Algorithms.
xiii. The Graphical User Interface.

Furthermore the second part of this course will put in context several ICT application areas to expose the students to the different possibilities and potential of this ever-growing area.

Method of Assessment: Examination: (60%) Assignment: (40%)

Duration of Examination: 2 Hrs

Textbooks:

- Introduction to Java Programming, 6th edition, by Y.Daniel Liang ISBN: 0132221586.
- Introduction to Object Oriented Programming with Java, 5th Edition, C. Thomas Wu, ISBN: 0073523305.

BIT5205 - Databases and their Implementations

Study-Unit Coordinator:	Mr. Joseph Vella
ECTS Credits:	5 ECTS
Study-Unit Mode:	Elective
Semester:	2
Tutorials / Practicals:	TBA
Lectures:	35 Hrs
Level:	5

The unit starts with an introduction to databases and Database Management Systems (DBMS) in context of their role in Computer Information Systems. Also a quick summary of major developments of databases, DBMSs and related computing artifacts is presented - e.g. for example the development of CODASYL, ANSI/SPARC generalisation of databases and DBMSs, and the emergence of the relational model. Also the main sub-systems expected in any DBMS are explained.

The first effort of this unit is the understanding of data models and an introduction to a language to model database schemas at an abstract level. This language is graphical in its representation of models and is independent of any implementation or physical details – the favourite of this unit is Chen's notation (and its derivatives).

The second effort is an introduction of a database model that is popular with the majority of implementations - Codd's relational model. The initial part concerns understanding the relational data model. We then study various languages that interact over the relational model: the relational algebra and Structured Query Language (SQL). We also study how a database schema, specified in an ERM diagram is converted into a set of SQL data definition constructs (e.g. CREATE TABLE commands). Related to the relational database model is our concern to control data redundancy in a database design, consequently we study Codd's original normal forms and their later refinements. The third part of the units describes practical facets that deal with striving for the DBMS to make efficient use of the available resources (e.g. RAM, HDs, communication networks, tapes). These include data sharing, query processing, and sophisticated data definition and manipulation languages. Also an important part is the emphasis of a multi tier implementation of a computer information systems (three tier for presentation, business and data processing) and how and with what can software developers design, implement and test these tiers.

Method of Assessment: Examination: (80%) Assignment: (20%)

Duration of Examination: 2 Hrs

Textbooks:

- R Elmasri & S Navathe, *Fundamentals of Database Systems*, Addison-Wesley.