E-D1

Existing university courses on the Semantic Web

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Abstract

This document provides an information about the existing courses on the Semantic Web, offered or planned by the participants of REWERSE and KnowledgeWeb. It also includes an information about courses offered outside of both networks, obtained by independent search efforts. The document is to be used as a reference in the planned work on defining a curriculum of graduate (master and Ph.D.) courses for education of researchers and practitioners in the field of the Semantic Web. The document consists of a report, providing a summary of the source information with some conclusions, and of an Appendix presenting the source information in a tabular form.

Keyword List

Semantic Web education, Semantic Web courses

Existing university courses on the Semantic Web

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20 July 2004

Abstract
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1 Introduction

The long range objective of this work is to develop a curriculum of graduate (master and Ph.D.) courses for education of researchers and practitioners in the field of the Semantic Web. The starting point for defining the curriculum are already offered and planned relevant courses. A survey of such courses should provide a general perspective on the state of this rapidly developing field and facilitate discussion about its structure. This paper is intended as such a survey. It is based on the information obtained from several independent sources:

- from REWERSE participants in response to a REWERSE Web questionnaire,
- from KnowledgeWeb participants,
- from an independent effort at the University of Heraklion,
- from Frank van Harmelen, who kindly commented on the initial version of this report and provided the authors with additional information about a number of courses offered outside of REWERSE and KnowledgeWeb.

In addition, following the suggestion of the Budapest University of Technology and Economics we also included the information about a graduate course on the Semantic Web and ontology management offered there. Some of the information obtained from REWERSE participants concerns courses offered within CoLogNet Education and Training Initiatives[1].

As KnowledgeWeb and REWERSE are the main European NoE's in the field of the Semantic Web, we believe that the collected information about all courses offered by these networks is sufficient as a starting point for the planned curriculum work. Together with the complements obtained by the additional search efforts mentioned above, the present document covers a substantial part of the graduate Semantic Web courses worldwide and is therefore interesting for the whole Semantic Web community. It also provides a good starting point for further analysis, for updates with more details and with information about new emerging courses, and for further search outside the networks.

This document consists of

- a report, providing a summary of the source information, discussion and suggestions concerning continuation of the curriculum work,
- the Appendix with a tabular summary of the collected source information.

The report is organized as follows. Section 2 describes the way how the information was collected and comments on the presentation of the collected information in the Appendix. Section 3 gives general comments about the courses and some statistics. It contains information about the number of offered and planned courses, geographical distribution, intended audience, forms of teaching and assessment, length, and credits. Section 4 presents information about the areas covered by the courses. It classifies the courses wrt specific topics and gives statistics about the number of courses covering similar topics. Section 5 discusses the materials and the textbooks recommended in the courses. Section 6 includes some conclusions and suggestions for continuation of the curriculum work.

[1] see http://centria.di.fct.unl.pt/~lmp/mestrado

As stated above, the information in the Appendix comes from different sources. For comparison it was put into a uniform tabular framework. However, in the case of a few courses the information collected does not cover all aspects requested in the REWERSE questionnaire. We decided to keep these courses on the list rather than removing them for incompleteness reasons.

2 The sources of the course information

The course information was collected as follows. The initial plan was to request information about the courses offered by REWERSE participants while establishing working contacts with Knowledge Web on cooperation with the Virtual Institute of the Semantic Web Education (VISWE), planned by KnowledgeWeb. It turned out that KnowledgeWeb was already independently collecting information about the courses offered by their members, and we decided to integrate the information from both sources. This information was later augmented, first by the information on Semantic Web related courses collected independently by the University of Heraklion, and then by the information obtained from Frank van Harmelen. This additional information includes courses offered outside of REWERSE and KnowledgeWeb. Finally we attached the information about the course offered in Budapest.

As both KnowledgeWeb and REWERSE requested information from all participants, we hope that the response gives a complete picture of the courses offered within the two NoE's. The complementary information from Heraklion, from Frank van Harmelen and from Budapest gives a few hints to the Semantic Web courses outside of REWERSE and KnowledgeWeb. We do not expect it to be complete but we were not able to find more courses. It may be extended in the future and may be used for finding new attractive cooperation partners for the VISWE.

2.1 REWERSE questionnaire and the structure of the Appendix

Implementing the workplan of REWERSE on Education and Training the coordinators of the ET workpackage requested from the REWERSE participants the information about offered and planned courses relevant, in their opinion, to the Semantic Web education. The intention was to investigate the possibility of integrating some of them, or their modified variants into the planned Semantic Web curriculum. The information is also to be used by the REWERSE Technology Transfer and Awareness package for planning industrial courses and possibly also for adapting existing university courses to industrial needs.

The request was to fill a Web questionnaire including the following items:

- Contact person
- REWERSE participant (selected from the list of NoE participants)
- Title
- Status: already offered (last run) / planned
- Type: traditional face-to-face/other (which?) and number of hours
- Intended audience (master students/ Ph.D. students /other (which?))
- Homepage: URL, if any
- Abstract

- Contents
- Literature
- Other available learning materials
- Language: English/other
- Comments (optional)

The deadline for the response was in April 2004. The topics of the questionnaire were used as a basis for designing the tabular course descriptions in the Appendix. For each response to the Web questionnaire describing a single course a table structured according to the topics above has been automatically created. Each table was inspected and if necessary edited to make the presentation as uniform as possible for further comparison. In case of missing/incomplete items an attempt was made to augment them by using the information provided at the course homepage and/or by the contact person. In some cases we were unable to obtain the missing information but we decided to keep an incomplete course description in the Appendix rather than removing it.

The Appendix is divided into two parts: Part A contains a list of the courses with their reference numbers and titles. As the Appendix integrates course information from different sources, each position of the list, and each respective table, also indicates the origin: REWERSE, KnowledgeWeb, Heraklion collection, van Harmelen's collection, or Budapest. Part B provides full descriptions of the respective courses.

To facilitate comparisons each of the parts of the Appendix is divided into two sections (A1,A2 and B1,B2), which correspond to two categories of courses. The first category includes long courses with more than 10 teaching hours. Most of them are actually full-term master courses. Short courses, which usually have very different objectives from the long ones, belong to the second category. For example some of them are single introductory lectures.

Courses in each section are sorted in the alphabetic order of their titles. This way courses obtain numbers, used as references to the Appendix in the rest of this report. The references to short courses include letter "s". For example [1] is the reference of the first course of the long course category, while [1s] is the reference of the first course of the short course category.

2.2 KnowledgeWeb course information

KnowledgeWeb course information was collected independently of REWERSE. A similar kind of information was requested. In addition, the KnowledgeWeb participants were asked to relate the described courses to the ongoing work on defining learning scenarios to be supported by the planned VISWE infrastructure, such as the traditional face-to-face (F2F) scenario, Community of Practice scenario etc. (For detailed description of these scenarios see the forthcoming REWERSE deliverable E-D3 due February 2005). The KnowledgeWeb course information was made available for inclusion in this report. In cases of missing/incomplete items an attempt was made to extract additional information from course homepages. We also translated to English a few course descriptions provided (and offered) in German. The additional information on course scenarios present in some descriptions is included in the respective tables as comment items.

2.3 The Heraklion collection

As explained above, information on some courses relevant for the Semantic Web and not included in the information obtained from REWERSE and from KnowledgeWeb was collected by an independent effort at the University of Heraklion. Using the REWERSE Web questionnaire software this information was integrated into the Appendix.

2.4 Frank van Harmelen collection

As a feedback to the initial version of this document we obtained from Frank van Harmelen URLs of several Semantic Web courses. Some of them turned out to be already included in the Heraklion collection. For the remaining ones we used the links to insert the available information into the tabular form used in the Appendix.

3 General statistics

This section gives some statistics of the courses obtained from all sources. The figures show the potential of the NoE participants for involvement in the joint REWERSE and Knowledge Web educational effort. The contents of the courses and their relevance for the Semantic Web education are discussed jointly in Section 4. The total number of course descriptions included in the Appendix is 64, out of which 25 originate from REWERSE, 20 from KnowledgeWeb, one was included both in REWERSE and in the Knowledge Web information, 9 come from the Heraklion collection, 8 from van Harmelen's collection and 1 from Budapest.

3.1 REWERSE courses

REWERSE participants submitted 26 course descriptions, 22 already offered, 4 planned. Five among the already offered courses had the last run before the academic year 03/04. Two of the courses offered at Lisbon are being restructured in 2004 for a new international Master Programme. Eight of the offered courses are at present taught in languages other than English.

The intended audience is as follows (o-offered, p-planned):

- master students: 13(o), 3(p)
- master students and Ph.D. students: 7(o)
- Ph.D. students: 2(o)
- industrial: 1(p) + 2 industrial versions of the offered courses above
- summer school: 5 summer school versions of the offered courses above

The descriptions of courses were submitted by 15 out of 27 regular REWERSE participants and by 2 out of 4 corresponding participants in non-European countries.

The number of descriptions submitted by these participants is as follows: Munich(2), Cairo (1), Dresden(2), Eindhoven (1), Göttingen (1), Hannover (1), Heraklion(2), Paris (1), Linköping(2), Lisbon(2), LibRT(1), Manchester(1), Naples (2), New York (1), Skövde(1), Turin (4), Vienna(1)

A majority of the submitted course descriptions falls into the long course category, with total number of teaching hours up to 56.

All of the courses are offered in traditional face-to-face form. Many of them are supported by Web material, mostly slides. For more details, see the Appendix.

3.2 KnowledgeWeb courses

The course information obtained from KnowledgeWeb includes 21 course descriptions, 20 already offered, 1 planned. Out of these 4 are short courses. 4 courses are offered in languages other than English.

The intended audience is as follows (o-offered, p-planned):

- master students: 7(o)
- master students and Ph.D students: 9(o)
- Ph.D. students: 3(o), 1(p)
- industrial (professionals): 1(o) + 3 industrial versions of the offered courses above
- researchers: 4 versions for researchers of the offered courses above

The descriptions of courses originate from 10 out of 18 KnowledgeWeb participants.

The number of descriptions submitted by these participants is as follows: ITI CERTH Thessaloniki (1), FUB Bolzano(3), FU Berlin (1), INRIA Rhône-Alpes (3), OU Milton-Keynes(1), UKARL Karlsruhe (2), VUM Manchester (3), USFD Sheffield (1), UNITN Trento (5), VU Amsterdam (1).

All these are offered in traditional face-to-face form but for 8 courses a version suitable for distance learning and supported by video material on the Web is also planned. A majority of the courses is already supported by Web material, mostly slides. For more details, see the Appendix.

3.3 Other courses

The remaining 18 course descriptions come from the Heraklion collection (9), van Harmelen's collection (8), and from Budapest (1). They are master and or Ph.D. courses offered at different universities. The topics covered by these courses essentially overlap with topics in the courses offered by REWERSE and KnowledgeWeb. One of the courses is a short course and all of them are already offered. A further search effort would probably allow to extend this list, and may be undertaken in the future. We expect this reference information to be of great value in the work towards the curriculum of the semantic Web education.

The Heraklion collection and van Harmelen's collection include the courses offered in the following countries: Austria (1), Canada (2), China (1), Ireland (1), Great Britain (3), Greece (2), The Netherlands (1), USA (6).

4 Areas/Topics covered by the courses

This section is a first attempt to classify the topics addressed by the collected courses. The classification is very rough and can only be considered as a first step towards a more detailed analysis aiming at better understanding of the structure of the field of the Semantic Web.

The topics of the courses can generally be classified as follows:

1. Foundations relevant for, but not directly addressing the Semantic Web
2. XML and basic Web information technologies
3. Semantic Web concepts and techniques
4. Other related techniques

As discussed below, some of the offered courses cover selected topics from one of the groups (1) - (4), others include topics from different groups to achieve some specific objectives.

We now survey the topics offered in each of the groups above; for each of them we show the indices of the respective courses. As some courses cover several topics, the same course index may appear several times.

1. Foundations
   (a) Database theory [7,12,25,26,47,48,49,56,58]:
   Relational databases, Object-oriented databases, Integration of data and metadata, Semistructured data, Data models
   (b) Logics, Knowledge Representation and Logic Programming:
   - FOPC, Description Logics, F-logic [1,3,6,8,9,10,11,19,20, 22,24,28,29, 30,31,32,47,55]
   - Modal and temporal logics [16,24,28,30]
   - Non-monotonic logics [2,35,38]
   - Automatic reasoning, Verification and model checking [16,30,31,54]
   - (Constraint) logic programming [1,4,5,15,29]
2. Basic Web information technologies [10,12,13,20,23,26,27,33,39, 43,46,47,48,49,51,53,56,57,58,1s]:
   XML, XML Schema, Namespaces, XPath, XSLT, XQuery, other XML query and transformation languages, Web data integration, Wrappers
3. Semantic Web concepts and techniques [1,6,9,10,11,12,13,14,17,19, 20,23,25,27,32,33,34,36,37,39,40,41,42,43,44,45,46,47,52,53,54,55, 57,2s,6s]:
   RDF, RDF Schema, RDF querying, Ontologies, OWL, Rules on the Semantic Web, RuleML, Integration of Rules and Ontologies
4. Other related techniques:
   - Agents [16,44,50]
   - Security [35,38]
   - Business rules [5s]
   - Knowledge management [23,25,36]
   - Hypermedia [14,21,39]
   - Other Web techniques [2,12,17,18,21,25,43,45,3s,4s]

The topics covered in the submitted/collected course information seem to fit well with the needs of the Semantic Web curriculum. However, many of the courses have been developed without intention to address the needs of the Semantic Web education, therefore extensive structuring and integration work is needed for re-using them for that purpose. At this stage it is also unclear which relevant topics are not addressed by the existing courses.

5 The materials used

An important question is availability of material for Semantic Web education. Some of the courses, especially at Ph.D. level, rely only on articles and Web material, but many courses use textbooks as basic or additional teaching material. The books in English used in the courses are:

- S. Abiteboul, D. Suciu and P. Buneman, *Data on the Web: From Relations to Semistructured Data and XML*, Morgan Kaufmann 2000 [47,56]
- G. Antoniou and F. van Harmelen, *A Semantic Web Primer*, The MIT Press 2004, http://www.semanticwebprimer.org [1,23,39,40,57]
- K.R. Apt, *Principles of Constraint Programming*, Cambridge University Press 2003 [4]
- F. Baader, *The Description Logic Handbook, Theory, Implementation and Applications*, Cambridge University Press 2003 [29]
- I. Bratko, *Prolog Programming for Artificial Intelligence*, Prentice Hall (2nd edition) 1990 [1,22]
- D. Chamberlin *et al.*, *XQuery from the Experts: A guide to the W3C XML Query Language*, Addison-Wesley 2003 [49, 56]
- A. B. Chaudhri, A. Rashid and R. Zicari, *XML Data Management: Native XML and XML-Enabled Database Systems*, Addison-Wesley 2003 [56]
- M. C. Daconta, L. Obrst and K.T. Smith, *The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management*, John Wiley & Sons 2003 [10,19]
- H. Deitel *et al*, *Internet & World Wide Web How to Program*, Prentice Hall [13]
- C. Delobel, C. Lecluse and P. Richard, *Databases: From Relational to Object-oriented Systems*, International Thomson Computer Press 1995 [47]
- D. Fensel, *Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce*, Springer-Verlag 2001 [47,33]
- D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*, The MIT Press/Triliteral 2003 [10,19,27,33,46,53]
- M. Fitting, *Proof methods for modal and intuitionistic logics*, D. Reidel 1983 [30]
- T. Frühwirth and S. Abdennadher, *Essentials of Constraint Programming*, Springer-Verlag 2003 [5]

- M. Ginsberg, *Essentials of Artificial Intelligence*, Morgan Kaufmann 1993 [2]
- J.Hjelm, *Creating the Semantic Web with RDF*, John Wiley & Sons 2001 [46,47]
- M. Hall and L.Brown, *Core Servlets and JavaServer Pages. Volume 1: Core technologies* (2nd edition), Prentice Hall PTR 2003 [26]
- E. R. Harold, *XML Bible* (2nd edition), Hungry Minds, NY 2001 [46]
- M.G. E. Hughes and M. J. Crewell, *A new introduction to modal logic*, Routledge 1996 [30]
- J. Hunter, *Java servlet programming* (2nd edition), O' Reilly 2001 [26]
- M. Huth and M. Ryan, *Logic in Computer Science: Modeling and reasoning about systems*, Cambridge University Press, 2000 [30]
- D. Lowe and W. Hall, *Hypermedia and the Web: An Engineering Approach*, Wiley 1999 [13]
- K. Marriott and P. J. Stuckey, *Programming with Constraints*, The MIT Press 1998 [5]
- J. Meyer and W. van der Hoek, *Epistemic Logic for AI and Computer Science*, Cambridge Tracts in Theoretical Computer Science, vol. 41, Cambridge University Press 1995 [30]
- T. Mitchell, *Machine Learning*, McGraw-Hill 1997 [2]
- N.J. Nilsson, *Principles of artificial intelligence*, Springer-Verlag 1982 [2]
- U. Nilsson and J. Maluszynski, *Logic, Programming and Prolog* (2nd edition), Wiley & Sons 1995 [29]
- D.Peled, *Software Reliability Methods*, Springer-Verlag 2001 [30]
- S. Powers, *Practical RDF*, OReilly 2003 [19]
- S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall 1997 [1,2]
- K.B.Sall, *XML Family of Specifications*, Addison-Wesley 2002 [49]
- W. Song and M. Zhang, *A First Step toward the Semantic Web*, Higher Education Press 2004 [33]
- F. Sowa, *Knowledge Representation*, Brooks/Cole 2000 [47]
- B. Stewart, *Information Architecture Meets Usability*, O'Reilly Associates 2003 [13]
- D.C. Tsichritzis and F.H. Lochovsky, *Data Models*, Prentice Hall 1982 [48]
- J.D. Ullman, *Principles of Database and Knowledge-base Systems* Vol.I, W.H.Freeman & Co. 1989 [22]
- M. Wooldridge, *An Introduction to MultiAgent Systems*, John Wiley & Sons 2002 [16]

- M. Wooldridge, *Reasoning About Rational Agents*, The Mit Press 2000 [16]
- Wrox Author Team, *Professional Java Server Programming*, Wrox Press Inc. 1999 [26]

There are 5 courses with no teaching material specified, and 13 courses which use only slides. 8 of the courses use lecture notes but only 5 of them in English. 17 of the courses use articles.

48 of the courses have Web pages where the course material in electronic form is accessible. 28 of these Web pages provide the material in English.

6 Discussion

The collected material confirms the involvement of REWERSE and KnowledgeWeb participants in Semantic Web education, and potential for development of a curriculum in this field based on already offered or planned courses.

An analysis of the material brings us to the following observations:

- There is a substantial overlap of topics in various courses with different objectives. Identifying topic-specific modules should facilitate re-use of existing expertise, and may open up new ways of combining the modules. For example, basic XML module is essential both for semi-structured data courses and for the Semantic Web survey course. Non-monotonic logics is relevant both for the rule layer of the Semantic Web and for modelling agents. More examples of this kind can be added. We suggest to encourage the authors of large courses to identify the natural modules of the courses, say of 4-6 teaching hours, and possibly to split the existing Web material (slides, etc.)into respective parts. This would provide a basis for development of modular e-learning material. It would also greatly facilitate organization of the Summer Schools, organized around a selection of such modules.
- The Appendix has been created in a distributed way, by many people involved in filling the web questionnaire. For this reason it was impossible to achieve uniformity of presentation. In spite of that we hope that the material is a good starting point for designing the curriculum of the Semantic Web education which is our main objective. On the other hand it cannot be considered as a detailed catalogue of available Semantic Web courses. This was not our objective, nor was this possible to achieve under given time constraints. Nevertheless, the reaction from the community during preparation of this deliverable shows interests for such a catalogue, possibly organized as an on-line database updatable by the community. Undertaking of such an effort was not included in the original workplan of REWERSE. It would require, among others,
  - Defining better classification and structure of the courses/modules and its use for search. This is also necessary for development of the planned Semantic Web curriculum. This would include definition and use of keywords, development of an ontology, indication of the pre-requisite structure between the existing courses, indication of similar courses, etc.
  - Augmenting the list of the courses. For this further perpetual search, and inclusion of the new emerging courses would be necessary.
  - Augmenting the existing course information with further details, such as: the proportion of time devoted to the indicated topics, the extent of exercises and laboratory

work, the kind of examination, number of students in comparison to other elective courses, student comments, etc.

- The web questionnaire did not specify explicitly the criteria for a course to be relevant for the Semantic Web. We relied in this matter on the opinion of the respondents. This caused some misunderstanding, since some participants included in their response the descriptions of foundational pre-requisite courses while the others restricted themselves to the courses strictly addressing the Semantic Web issues. We decided to keep all information submitted, as a valuable input in the planned effort of development of a Semantic Web ontology. On the other hand, as discussed above, creation of a database of course descriptions would require further extensions to the information from the Appendix.

- The foundational courses/modules have a substantial overlap with the courses developed and offered within CoLogNet ET Initiatives, such as International Master Programme in Computational Logic. Some of the courses on the REWERSE list (Lisbon) are actually offered in this programme. One should consider further possibilities of reusing the CoLogNet contributions within REWERSE/KnowledgeWeb ET, as well as offering modules developed by REWERSE in connection European Master courses. This should be discussed with all interested parties.

- The courses of the list have no support for e-learning, even though some KnowledgeWeb courses already plan to do so. One should identify modules, which could be first adapted for inclusion into the VISWE infrastructure and develop a concrete plan of action for achieving that.

- There are only few industrial courses on our list. We suggest that the collected information be analyzed by the REWERSE TTA Committee to assess if some of the university courses/modules can be adapted to industrial needs.

- For future work aiming at the Semantic Web curriculum there is a need for better understanding of the structure of the field. We suggest to combine this effort with the planned work on defining course modules. Using a feedback from the community, it would be desirable to define an ontology of the Semantic Web. It could be helpful for structuring the course modules in relation to the classes of this ontology.

- The courses on the list do not include extensive case studies, with except of those covered by the book by Antoniou and van Harmelen. It seems very desirable to follow the emerging applications of the Semantic Web and to include the relevant material in the courses.

A List of courses

A.1 Long courses

Index	Title	Origin
1	Agent-Based Internet Computing	H
2	Artificial Intelligence and Machine Learning	R
3	Computational Logics	K
4	Constraint Programming	R
5	Constraint Reasoning and Programming	R
6	Course on Ontologies	K
7	Database Technology	R
8	Description Logics	K
9	DLs for Conceptual Design, Information Access, and Ontology Integration	K
10	Foundations of the Semantic Web	H
11	Foundations of the Semantic Web and Ontology Management	B
12	Global Information Systems	H
13	Hypertext and Web Technologies	F
14	Information Retrieval, Hypermedia and the Web	K
15	Integrated Logic Programming	R
16	Intelligent Agents: modeling and reasoning techniques	R
17	Intelligent Systems in WWW (Intelligente Systeme im WWW)	K
18	Introduction to Human Language Technology for the Semantic Web	K
19	Introduction to the Semantic Web	F
20	Issues on Knowledge Representation on the Web	R
21	Knowledge Assisted Multimedia Content Analysis Using Semantic Web Technologies	K
22	Knowledge Base Programming with Frames and Logic	R
23	Knowledge Management on the Web	R
24	Knowledge Representation and Reasoning	K
25	Knowledge management	K
26	Laboratory of Web Applications	R
27	Lectures on Semantic Web	F
28	Logic for Computer Scientists	R
29	Logic Programming	R
30	Logics for Computer Science	R
31	Logics for knowledge representation and reasoning	K
32	Logics for the Web	R
33	Metadata, Ontology and the Semantic Web	F
34	Models of knowledge representation	K
35	Nonmonotonic reasoning and security	R
36	Ontology in a Nutshell	K
37	RDF for the Semantic Web	K
38	Security and privacy	R
39	Semantic Web	R
40	Semantic Web	R
41	Semantic Web	H
42	Semantic Web	H
43	Semantic Web	H
44	Semantic Web and Intelligent Agents	H
45	Semantic Web Services	K
46	Semantic Web Techniques	F
47	Semantic Web: Models and Query Languages	H
48	Semistructured Data	R
49	Semistructured Data and XML	R
50	Software Agents	R
51	Technologies of the Web based Information Systems	R
52	The Intelligent Internet	F
53	The Semantic Web	H
54	The Semantic Web	F
55	The Semantic Web: Ontologies and OWL	K,R
56	Web Data Management	R
57	Web-based Knowledge Representation	K
58	XML and Databases	R

A.2 Short courses

Index	Title	Origin
1s	A three hour introduction to XML	K
2s	An Introduction to Semantic Web Technologies	F
3s	Brief introduction to ANT	K
4s	Brief introduction to JNDI	K
5s	Introduction to business rules	R
6s	Semantic Web Information Day	K

The tables above indicate the origin of each course using letters R, K, H, B, F which correspond to REWERSE, KnowledgeWeb, Heraklion's collection, Budapest and Frank van Harmelen's collection, respectively.

B Descriptions of courses

B.1 Long courses

Index	1
Origin	Heraklion's collection
Participant	n/a
Institution	Technical University of Crete, Greece
Contact person	Manolis Koubarakis manolis@intelligence.tuc.gr
Title	Agent-Based Internet Computing
Status	Already offered, last run: 2004
Course type	Traditional, 20 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.intelligence.tuc.gr/~agents/
Abstract	The course gives an introduction to techniques and methods related to application of logics in Semantic Web with focus on knowledge representation and reasoning techniques.
Contents	Knowledge representation and reasoning. Propositional logic and first-order logic (FOL). Using FOL to represent knowledge. Model theory, proof theory and inference for FOL. Unification, forward and backward chaining, resolution. Knowledge engineering, ontologies, example applications. Logic programming, Prolog, Datalog and database querying, theorem provers, constraint logic programming. Advanced knowledge representation languages: semantic data models, frame systems, terminological logics and higher-order logics. Example languages: Telos, CLASSIC and F-logic. Ontologies and knowledge representation in the age of the Web. The Semantic Web. Knowledge representation with Semantic Web Languages RDF(S) and OWL. The New Frontier: Agents, Semantic Web, P2P Computing and Grid Computing.
Literature	S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall 1997 I. Bratko, *Prolog Programming for Artificial Intelligence*, Prentice Hall (2nd edition) 1990 G. Antoniou and F. Van Harmelen, *Semantic Web Primer*, The MIT Press 2004
Materials	slides
Language	Other
Comments	

Index	2
Origin	REWERSE
Participant	Turin
Institution	Universita degli Studi di Torino, Italy
Contact person	Alberto Martelli mrt@di.unito.it
Title	Artificial Intelligence and Machine Learning
Status	Already offered, last run: 2002-2003
Course type	Traditional, 54 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.di.unito.it/~botta/didattica/iaml.html
Abstract	This course introduces the student to the artificial intelligence areas of reasoning, planning, and learning. The students are supposed to have basic notions about AI and logics.
Contents	Reasoning mechanisms: - logical resolution - non-monotonic reasoning - truth maintanance systems - approximate reasoning - qualitative reasoning Planning: - non-linear, hierarchical, conditional planning - planning and acting Learning: - learning from examples - genetic algorithms - learning in knowledge bases Specialistic seminars
Literature	N.J. Nilsson, *Principles of artificial intelligence*, Springer-Verlag 1982 S. Russell, P. Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall 1997 S. Russell, P. Norvig, *Intelligenza Artificiale: Un Approccio Moderno*, UTET 1998 M. Ginsberg, *Essentials of Artificial Intelligence*, Morgan Kaufmann 1993 T. Mitchell, *Machine Learning*, McGraw-Hill 1997
Materials	slides
Language	Other
Comments	

Index	3
Origin	Knowledge Web
Participant	FUB
Institution	Free University of Bozen-Bolzano, Italy
Contact person	Enrico Franconi franconi@inf.unibz.it
Title	Computational Logics
Status	Already offered
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.unibz.it/inf/acs/courses02_03_y2/logic/
Abstract	Introduction to Computational Logic
Contents	1) Introduction 2) Propositional Logic 3) FOL 4) Modelling using set theory 5) Modelling using set FOL
Literature	
Materials	slides, exercises, background papers
Language	English
Comments	Course intended for: *M.Sc. Programme 24 teaching hour(s) 4 credit points partner is willing to provide it as: distance course within a university cooperation

Index	4
Origin	REWERSE
Participant	Paris
Institution	INRIA, France
Contact person	Francois Fages Francois.Fages@inria.fr
Title	Constraint Programming
Status	Already offered, last run: 2nd semester 2004
Course type	Traditional, 20 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://contraintes.inria.fr/~fages/Teaching
Abstract	This course provides an introduction to constraint programming with a strong focus on logics and semantics. It introduces some advanced topics on concurrent constraint programming and linear logic. The course can be adapted however to various audience by focusing either on the logical properties of constraint systems and languages, on the constraint solving methods or on the applications of constraint programming.
Contents	1. Introduction 2. Logical background, complete theories and decidability of constraint languages 3. Constraint Logic Programming I: programs, examples CLP(H,B,FD,R), constraint propagation algorithms 4. Constraint Logic Programming II: operational and fixpoint semantics, abstract interpretation, constraint-based model checking 5. Constraint Logic Programming III: logical semantics, automated deduction, higher-order 6. Concurrent Constraint Programming I: operational semantics and examples 7. Concurrent Constraint Programming II: denotational semantics and constraint propagation 8. Concurrent Constraint Programming III: linear logic semantics
Literature	
Materials	slides, exercises, lecture notes
Language	English
Comments	

Index	5
Origin	REWERSE
Participant	Cairo
Institution	German University in Cairo, Egypt
Contact person	Slim Abdennadher slim.abdennadher@guc.edu.eg
Title	Constraint Reasoning and Programming
Status	Already offered, last run: 2002
Course type	Traditional, 36 teaching hour(s)
Intended audience	Master students, PhD students, summer school, industrial, researchers
Course page	http://www.pms.informatik.uni-muenchen.de/lehre/constraints/
Abstract	The use of constraints had its scientific and commercial breakthrough in the 1990s. Programming with constraints makes it possible to model and specify problems with uncertain, incomplete information and to solve combinatorial problems, as they are abundant in industry and commerce, such as scheduling, planning, transportation, resource allocation, layout, design, and analysis. Constraint-based programming languages enjoy elegant theoretical properties, conceptual simplicity, and practical success. The idea of constraint-based programming is to solve problems by simply stating constraints (conditions, properties) which must be satisfied by a solution of the problem. Constraints can be considered as pieces of partial information. Constraints describe properties of unknown objects and relationships between them. Constraints are formalized as distinguished, predefined predicates in first-order predicate logic. The unknown objects are modeled as variables. For example, consider a bicycle number lock. We forgot the first digit, but remember some constraints about it: The digit was an odd number, greater than 1, and not a prime number. Combining the pieces of partial information expressed by these constraints (digit, greater than 1, odd, not prime) we are able to derive that the digit we are looking for is "9". As it runs, a constraint program successively generates constraints. As a special program, the constraint solver stores, combines, and simplifies the constraints until a solution is found. The partial solutions can be used to influence the run of the program.
Contents	The theoretically well-founded presentation includes application examples from real life. It introduces the common classes of constraint programming languages and constraint systems in a uniform way. We first introduce the basic ideas behind the family of (concurrent) constraint logic programming languages in a calculus-based framework. Constraint solving algorithms are specified and implemented in the constraint handling rules language (CHR). in a uniform high-level executable notation. We will present some of the most common constraint domains, their solvers and applications such as Boolean constraints for circuit design, linear polynomial equations for financial and engineering applications and finite domains for scheduling. This course was last held at the University of Pisa in 1999 and 2002. It can be combined with a practical lab course using the free Yap Prolog or the commercial Sicstus Prolog constraint logic programming language. The family of (concurrent) constraint logic programming languages Preliminaries of Syntax and Semantics Constraint logic programming (incl. Prolog) Concurrent committed-choice constraint logic programming Constraint handling rules (CHR) Constraint systems and their solvers Rational Trees Feature Terms Description Logic Boolean Constraints Finite Domains Linear polynomial equations Non-Linear polynomial equations Applications Commercial applications, market and companies Case study Munich rent advisor on the internet Case study Planning wireless telecommunication Case study Timetabling and Roomplanning
Literature	T. Frühwirth and S. Abdennadher, *Essentials of Constraint Programming* Springer-Verlag 2003 Kim Marriott and Peter J. Stuckey, *Programming with Constraints*, The MIT Press 1998
Materials	slides, exercises
Language	English
Comments	

Index	6
Origin	Knowledge Web
Participant	INRIA
Institution	INRIA, France
Contact person	Fabien Gandon Fabien.Gandon@sophia.inria.fr
Title	Course on Ontologies
Status	Already offered
Course type	Traditional, 12 teaching hour(s)
Intended audience	Master students, PhD students
Course page	http://www-sop.inria.fr/acacia/personnel/Fabien.Gandon/lecture/emse_ontologie2002/
Abstract	Introduction to: problems solved by ontologies in information retrieval, ontoogies, knowledge modelling, ontology life-cycle, knowledge representation formalisms, examples of ontologies, special case of SW, ontologies and multiagent systems
Contents	
Literature	
Materials	slides, exercises
Language	Other
Comments	

Index	7
Origin	REWERSE
Participant	Skövde
Institution	Högskolan i Skövde, Sweden
Contact person	Mikael Berndtsson spiff@ida.his.se
Title	Database Technology
Status	Already offered, last run: Sep-Dec 2003
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.ida.his.se/ida/kurser/database_systems/
Abstract	This course aims to introduce students to the new generation of database systems, giving them a critical introduction to developments in database modelling and changes in supporting theory, technology, standards and tools. The course covers 5 study points (7.5 ECTS). Students completing this course should be able to demonstrate good knowledge of the state of the art in advanced database systems, and be able to critically appraise developments in this demanding and rapidly expanding field. They should be able to demonstrate that they can appropriately select and use database systems, techniques and tools in a broader information systems environment.
Contents	The course will have three main themes: database modelling and support; database support for enterprise computing; and cooperative information systems. Each is described briefly below. The trend towards broader applicability of database systems is unrelenting. Such broadening has significant implications for the data models used and the tools to support the use of these richer models. Efforts by the standardisation committees to reflect these pressures has also been immense. Major topics will include: developments in SQL and related standards, design transparency, interchange of model information between tools and the evaluation of CASE tools. Enterprise requirements for information access are continually growing, with increasing demands for effective support for wider access to all enterprise data. This may be in the form of data warehousing to support data mining, or database support within the context of enterprise intranets and the WWW. These issues will be explored under the heading of database support for enterprise computing. There will be an introduction to active database functionality, both as a supporting technology for database functionality and as a means for capturing business rules at the database level. At the level of database funtionality, the course will highlight the use of active capabilities in supporting cooperative behaviour between autonomous information systems. Such cooperative information systems offer significant promise for future large-scale information systems integration.
Literature	http://www.ida.his.se/ida/kurser/database_systems/kursmaterial/references/references.html
Materials	slides
Language	English
Comments	The link is to the old web page. During summer 2004 we will revise the web pages, including the change of the course name to "database technology". Within the "active database" module, we have started to introduce papers that targets active rules for the web. For next semester, we will have one active database lecture and (probably) two lectures on active rules technology for the semantic web.

Index	8
Origin	Knowledge Web
Participant	FUB
Institution	Free University of Bozen-Bolzano, Italy
Contact person	Enrico Franconi franconi@inf.unibz.it
Title	Description Logics
Status	Already offered
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.inf.unibz.it/%7Efranconi/dl/course/
Abstract	Introduction to DLs
Contents	1) A review of Computational Logics 2) Structural Description Logics 3) Propositional Description Logics 4) Description Logics and Knowledge Bases 5) Description Logics and Logics 6) Description Logics and Databases
Literature	
Materials	slides, exercises, background papers
Language	English
Comments	Course intended for: *M.Sc. Programme 24 teaching hour(s) 4 credit points partner is willing to provide it as: distance course within a university cooperation

Index	9
Origin	Knowledge Web
Participant	FUB
Institution	Free University of Bozen-Bolzano, Italy
Contact person	Enrico Franconi franconi@inf.unibz.it
Title	DLs for Conceptual Design, Information Access, and Ontology Integration
Status	Already offered
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.inf.unibz.it/~franconi/dl/course/phd-course/
Abstract	Introduction to DLs for Semantic Web
Contents	1) Extended ontology language and a methodology for conceptual and ontology design 2) A global framework will be introduced, together with various basic tasks involved in information access 3) General issues about ontology integration
Literature	
Materials	slides, exercises, background papers
Language	English
Comments	Course intended for: *M.Sc. Programme 24 teaching hour(s) 4 credit points partner is willing to provide it as: distance course within a university cooperation

Index	10
Origin	Heraklion's collection
Participant	n/a
Institution	Concordia University, Montreal, Canada
Contact person	Volker Haarslev haarslev@cs.concordia.ca
Title	Foundations of the Semantic Web
Status	Already offered, last run: Winter 2004
Course type	Traditional, 14 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.cs.concordia.ca/
Abstract	Web markup languages, World Wide Web Consortium (W3C) standards, extendable markup language (XML), resource description framework (RDF), schema for markup languages, Semantic Web, ontology development, markup languages for ontologies, ontology inference layer (OIL), DARPA agents markup language (DAML), DAML+OIL, ontology web language (OWL), logical foundations of ontologies, frame languages, description logics.
Contents	The lectures will cover the following topics: Description Logics Basics of XML RDF Ontology Web Language (OWL) Ontology Design
Literature	D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential* 2003, The MIT Press/Triliteral 2003 M. C. Daconta, L. Obrst and K.T. Smith, *The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management* John Wiley & Sons 2003
Materials	slides, exercises
Language	English
Comments	

Index	11
Origin	Budapest
Participant	n/a
Institution	Budapest University of Technology and Economics, Hungary
Contact person	Gergely Lukacsy lukacsy@cs.bme.hu
Title	Foundations of the Semantic Web and Ontology Management
Status	Already offered, last run: 2003/2004 spring semester
Course type	Traditional, 4 hours/week teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.cs.bme.hu/~stilgar/vima9000/index.html
Abstract	The course provides two approaches for the semantic web. We talk about the creation of intelligent search engines, how RDF could help in this, what are RDF schemas, RDF query languages and so on. However we also introduce the concept of Description Logic, the inference algorithms on DL Tboxes/Aboxes and its application in conventional information and knowledge management systems. The two approaches meet in the language OWL. Basically we prefer a well established and precise discussion on Semantic Web. For example, at the time we introduce the language OWL, we have already talked about all the DL constructs available in OWL (including nominals and datatypes also).
Contents	We start with the theory of search engines, show how google page ranking algorithm works, what are the bottlenecks of efficient and intelligent internet search. Then we introduce the concept of the semantic web, XML, RDF and RDF schemas. We talk about RDF query languages, how to put RDF information to the web. In the middle of the course we start to talk about base logic concept, first-order logic, then description logic. We introduce the concept of TBox/ABox, the semantic of DL, the possible inferences. Then, we talk about concrete algorithms, such as Tableau, etc. From ALC tableau, step by step we reach SHIQ and RIQ based Tableau. At the end of the course we introduce OWL (it seems very easy to talk about it after DL concepts) and the model theory of RDF and its problems.
Literature	The coursebook is currently being written. Parts of it are available as lecture notes at the course home page (for now, only in hungarian).
Materials	slides, exercises, lecture notes
Language	Other
Comments	This is a hungarian course at the Budapest University of Technology and Economics, intended for computer science students. The course takes 13 weeks to complete with small homework and big homework assignments, mid-term and final exam. Small homeworks included creation of RDF data and RDF schemas, using interactive editors. Big homework could be selected as either: write a program which could visualize an RDF graph, write a program which impements ALCN Tableau algorithm.

Index	12
Origin	Heraklion's collection
Participant	n/a
Institution	University of Georgia, U.S.A.
Contact person	Amit Sheth amit@cs.uga.edu
Title	Global Information Systems
Status	Already offered, last run: 2003
Course type	Traditional
Intended audience	Master students, PhD students, researchers
Course page	http://lsdis.cs.uga.edu/GlobalInfoSys/
Abstract	This course deals with architecture, infrastructure, enabling technologies and applications of Web-based Information Systems. We are particularly interested in information systems and e-services that support large enterprises (e.g., Enterprise Content Management), that span multiple enterprises (e.g., CRM), and are pan-Web (e.g., Internet Search Engines). This is an advanced course involving topics in Internet/WWW, Database Management, Information Systems, Information Retrieval and and other related fields.
Contents	Examples of Global Information Systems: -Within enterprises: Enterprise Content Management, Inta-Enterprise Portals -Across Enterprises: B2B and e-service applications -Pan-Web: Search Engines Conceptual bases of dealing with data/information: Syntax, Structure and Semantics; Data, Metadata, Information, Knowledge Understanding types of data and their management on the Web: -Unstructured data -Semi-structured data -Structured data Semi-structured data management and its importance to Global Information Systems; XML for data exchange, XML Schema, XML Query, native and non-native XML data management Metadata, metadata standards, RDF and metadata processing, RDFS, RDF Query, RDF storage and management Techniques for content/data management: -Classification and categorization -metadata extraction Tools and possibly one commercial product Core technologies and product categories: Application Servers, EAI, etc. Research/Emerging Issues, Commercial Landscape: -Semantics : Ontology, OWL -Component architecture based on Web Services, Web Service Standards and Technologies, SOAP, WSDL, UDDI
Literature	
Materials	literature
Language	English
Comments	

Index	13
Origin	van Harmelen's collection
Participant	n/a
Institution	University of Southampton, UK
Contact person	Les Carr lac@ecs.soton.ac.uk
Title	Hypertext and Web Technologies
Status	Already offered, last run: Spring 2004
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.ecs.soton.ac.uk/ucas/syllabus.php?unit=CM322:COMP3016
Abstract	The aim of this course is to teach the students the technologies and techniques for creating large-scale hypertext information systems on the WWW. Based on recent hypertext research and current WWW standards it will address the issues of publishing individual documents and sites together with the problems of global information management. The student will be able to: - Use XML, XSL, XLink and SMIL appropriately to create documents. - Design the information structure of an entire Web site. - Understand the algorithms of text- and image-based search engines. - Make use of metadata schemas to describe resources and to process those descriptions. - Understand the "missing link" problem and how to address it.
Contents	- Current Web data standards - XML, XSL, XLink, DOM, SMIL - Processing XML documents - Deploying XML data - Current Web metadata standards - RDF, RDF-SCHEMA - Ontologies, Dublin Core - Metadata processing - Surfing the semantic web - Hypertext Linking - Open Hypermedia philosophy - Hypertext history - The Missing Link: problems and solutions - Web Site Construction - Hypermedia Engineering - Hypermedia Development Methods - Hypermedia Developent Techniques - Web Site Maintenance - Case study - Web Searching - Information retrieval history - Search engine algorithms - Case studies: Harvest, Google, Inquirus
Literature	D. Lowe and W. Hall, *Hypermedia and the Web: An Engineering Approach*, Wiley 1999 B. Stewart, *Information Architecture Meets Usability*, O'Reilly Associates 2003 H. Deitel *et al*, *Internet & World Wide Web How to Program*, Prentice Hall
Materials	
Language	English
Comments	

Index	14
Origin	Knowledge Web
Participant	Manchester
Institution	The Victoria University of Manchester, UK
Contact person	Carole Goble carole@cs.man.ac.uk
Title	Information Retrieval, Hypermedia and the Web
Status	Already offered
Course type	Traditional, 44 teaching hour(s)
Intended audience	Master students
Course page	http://www.cs.man.ac.uk/ugrad/syllabus2003latest/CS3352.htm
Abstract	Databases are not the only means for the storage, and subsequent retrieval of information, – in fact databases only hold the subset of information known as "structured data". Although this constitutes the majority of data that drives the operational processes of an enterprise, it is actually the minority of information that is found in an enterprise. Documents and hypermedia are also information repositories, often referred to as semi-structured data, and forming the backbone of Digital Libraries and the Web. Work has gone on for at least a decade on how to manage and find electronic documents, and how to structure and navigate hypertexts. Work has been going on for centuries on how to manage and catalogue libraries. The Web, as a global document repository and a distributed hypermedia, makes this area of information management more important than ever. A customer or another business finding my businesses web pages is a matter of my business's survival in e-Commerce land. This course unit aims to give students an understanding of the issues and some solutions in hypermedia development, design document management and retrieval and metadata management. The case study is the Web and the Semantic Web.
Contents	1. The objective of the course is that students will understand the fundamental techniques for hypermedia architectures, design and usability; document management and retrieval and metadata management. By the end of the course the student should: 2. be familiar with the fundamentals of hypermedia systems, and hypermedia design and usability methodologies, sufficient to know how to develop a good web hypermedia and why a web site is good or bad; 3. understand the difficulty of representing and retrieving documents. 4. be familiar with the classical techniques of Information Retrieval, and the additional techniques employed by Web search engines sufficient to understand how web search engines work and how they could be improved; 5. be familiar with techniques for conveying the meaning of documents or hypermedia content – for example, metadata, ontologies, thesauri, and classification taxonomies – sufficient to understand their application to the "Semantic Web"; 6. understand the latest W3C technologies for linking, describing and searching the Web; 7. understand the relationship between IR, hypermedia and semantic models.
Literature	
Materials	slides, lecture notes, background papers
Language	English
Comments	

Index	15
Origin	REWERSE
Participant	Dresden
Institution	Technische Universität, Dresden, Germany
Contact person	Michael Schroeder ms@mpi-cbg.de
Title	Integrated Logic Programming
Status	Planned, start date: Oct 2004
Course type	Traditional, 14 teaching hour(s)
Intended audience	Master students, researchers
Course page	
Abstract	The module is just planned and not all details are laid out. The basic idea is to take information integration applications (in bioinformatics) and apply web and logic programming to solve the problems. Thus the module will build upon things done in REWERSE. Sample applications are - LP and Java - LP and DB access - LP and XML - LP and distributed computing - Rules to specify and execute distributed workflows - Rules and constraints for fold prediction - Rules to reason over ontologies
Contents	Details are not yet clear
Literature	
Materials	slides
Language	English
Comments	

Index	16
Origin	REWERSE
Participant	Turin
Institution	Universita degli Studi di Torino, Italy
Contact person	Alberto Martelli mrt@di.unito.it
Title	Intelligent Agents: modeling and reasoning techniques
Status	Already offered, last run: March 2004
Course type	Traditional, 15 teaching hour(s)
Intended audience	PhD students, researchers
Course page	http://www.di.unito.it/~mrt/BISS04/

Abstract	The purpose of the course is to present modeling and reasoning techniques for intelligent agents, based on formal methods. Intelligent agents are presented from two viewpoints. First of all it is shown how to model the behavior of a single agent, in particular referring to the belief-desire-intention (BDI) model. Then the problem of modeling and reasoning in multi-agent systems is tackled, by describing communication and cooperation among agents. Finally it is shown how the above models can be implemented by using computational fragments of the logic formalisms, and how they can be used to prove properties of agent systems.
	Outline of the course:
	- Introduction to intelligent agents
	- The belief-desire-intention model
	- Formal techniques for modeling agents
	  - modal and temporal logics
	  - reasoning about actions
	- Communication
	  - speech acts
	  - Agent Communication Languages: KQML and FIPA
	  - communication protocols
	- Logic based specification and implementation of intelligent agents
	- Verification of multi-agent systems: model checking

Contents	- Introduction to intelligent agents
	- Formal techniques for modeling agents
	  - logical foundations (modal and temporal logics)
	  - BDI models
	- Implementing rational agents
	  - logic based specification and implementation languages
	- Multi-agent systems
	  - communication languages and protocols
	- Verification of multi-agent systems: model checking

Literature	M. Wooldridge, *An Introduction to MultiAgent Systems*, John Wiley & Sons 2002 M. Wooldridge, *Reasoning About Rational Agents*, The Mit Press 2000
Materials	slides
Language	English
Comments	

Index	17
Origin	Knowledge Web
Participant	Karlsruhe
Institution	Universität Karlsruhe, Germany
Contact person	Max Völkel mvo@aifb.uni-karlsruhe.de
Title	Intelligent Systems in WWW (Intelligente Systeme im WWW)
Status	Already offered
Course type	Traditional, 18 teaching hour(s)
Intended audience	PhD students
Course page	http://www.aifb.uni-karlsruhe.de/Lehre/Sommer2004/ISWWW/
Abstract	In the future web knowledge will play a central role in e-commerce and in the internet portals. Knowledge mediation must be based on semantics. The notion of *Semantic Web* coined by Tim Berners-Lee, the inventor of the World Wide Web, refers to intelligent use of WWW for transfer and exchange of the contents which is understandable both for machines and men. The Semantic Web is based on the methods of data modelling, database programming and artificial intelligence. These methods give rise to innovative technologies and services which facilitate sharing of knowledge. The lectures present the methods in this field and show how software agents in the future Semantic Web can use them in knowledge portals, B2B and B2C.
Contents	1. Introduction (approx. 2 hours) 2. Semantic Web Languages (approx. 10 hours) 3. Ontology Engineering (approx. 2 hours) 4. Metadata (approx. 2 hours) 5. Peer-to-Peer (2 hours) 6. Web Services (2 hours)
Literature	
Materials	slides, exercises, background papers
Language	Other
Comments	Course intended for: *Community of Practice available as: learning unit for self-study

Index	18
Origin	Knowledge Web
Participant	USFD
Institution	University of Sheffield, UK
Contact person	Hamish Cunningham hamish@dcs.shef.ac.uk
Title	Introduction to Human Language Technology for the Semantic Web
Status	Already offered
Course type	
Intended audience	PhD students, researchers, professionals
Course page	
Abstract	The Semantic Web (SW) is adding a machine-tractable layer to the natural language web of HTML. The Grid initiative is constructing infrastructure for distributed collaborative science, or e-science. Web Services are driving the decomposition of monolithic software into flexible component sets that can be reconfigured to keep ahead in rapidly changing markets. The three areas are closely linked: web technology is essential to the Grid; the Semantic Web and the Grid are co-penetrating to form the Semantic Grid; Web Services underpin the next generation of the Grid in the Open Grid Services Architecture; Semantic Web Services (SWSs) allow dynamic construction of applications from component services, and better service description and discovery. Together these developments represent the next stage of evolution for the web, distributed computing and collaborative science. Key to the success of the enterprise is the production and maintenance of formal data. The SW and SWSs rely on formal semantics in the shape of ontologies and related instance sets, or knowledge bases. Whereas the simplicity of HTML and the ubiquity of natural language led to the organic growth of the hypertext web, semantic data is harder to create and maintain. HLT provides the missing link between language and formal data, the glue to fix web services to their user constituency and enable easier enterprise integration. This tutorial will cover the use of HLT for the Semantic Web and Web Services.
Contents	slides from 4 hour tutorial plus accompanying notes and web-based materials
Literature	
Materials	slides, web-based materials
Language	English
Comments	The material will be adapted from the tutorial given by USFD at ESWS 2004. A previous version is available currently at http://gate.ac.uk/sale/talks/sekt-tutorial.ppt Course intended for: *Community of Practice 4 teaching hour(s) available as: learning unit for self-study, slides and accompanying notes and web materials partner is willing to provide it as: part of summer school, distance course/lecture

Index	19
Origin	van Harmelen's collection
Participant	n/a
Institution	University of Michigan, U.S.A.
Contact person	Joseph Hardin hardin@umich.edu
Title	Introduction to the Semantic Web
Status	Already offered
Course type	Traditional
Intended audience	Master students, researchers
Course page	www-personal.si.umich.edu/~hardin/semantic_course.html
Abstract	
Contents	1. Broad Overview 2. Markup 3. RDF Overview 4. RDF Examples 5. Ontologies 6. Tools for Ontology Construction 7. TAP project at Stanford 8. AI History and Development 9. Reasoning Engines 10. Semantic Web-enabled Agents 11. Applications in Education 12. Applications in Business 13. Tracking an Emerging Discipline 14. Project Presentations
Literature	D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*, The MIT Press/Triliteral 2003 M. C. Daconta, L. Obrst and K.T. Smith, *The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management*, John Wiley & Sons 2003 S. Powers, *Practical RDF*, OReilly 2003
Materials	articles
Language	English
Comments	

Index	20
Origin	REWERSE
Participant	Lisbon
Institution	Universidade Nova de Lisboa, Portugal
Contact person	Carlos Damasio cd@di.fct.unl.pt
Title	Issues on Knowledge Representation on the Web
Status	Already offered, last run: 2nd semester 03/04
Course type	Traditional, 30 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.di.fct.unl.pt/mei0304/docdisciplinas/trcw/
Abstract	The course starts by explaining and motivating the origins of the Semantic Web and its logical layered structure. Some basic concepts are overviewed, namely UNICODE, URIs and IRIs, XML Base, XML Namespaces, XSL, and XML Canonicalization. The Resource Description Framework (RDF) and RDF Schema languages are introduced for describing resources and basic vocabularies in the Semantic Web. RDF(S) model theory and inference mechanisms are also addressed, as well as practical applications and its limitations. Description Logics are then introduced as a better knowledge representation formalism. Its constructs and semantics are introduced, as well the basic reasoning tasks and corresponding algorithms. The OWL language is presented and applications are provided. The course finishes, by studying the existing proposals for the integration of ontologies with rules in the Semantic Web, in particular the RuleML language proposal is discussed.
Contents	The course has just started beginning of March 04. More information will be available soon at a specific course instance web page. Check http://www.di.fct.unl.pt/mei0304/docdisciplinas/semestre2.html for the link there.
Literature	
Materials	
Language	English
Comments	This course is being offered in English in the new MSc in Computational Logic, starting September 04. Cf. http://centria.di.fct.unl.pt/~lmp/mestrado

Index	21
Origin	Knowledge Web
Participant	Centre for Research and Technology Hellas
Institution	Centre for Research and Technology Hellas, Greece
Contact person	Yiannis Kompatsiaris ikom@iti.gr
Title	Knowledge Assisted Multimedia Content Analysis Using Semantic Web Technologies
Status	Already offered
Course type	Traditional, 35 teaching hour(s)
Intended audience	Master students, PhD students
Course page	
Abstract	Analysis of audiovisual content is assisted with the use of knowledge based on a multimedia ontology infrastructure. The knowledge represenation enables the detection of audiovisual objects, which correspond to the semantic concepts defined in the ontology. Semantic Web technologies and inference rules can also be used for the definition of semantically important events. This multimedia analysis approach provides a framework for ontology-based annotation, search and retrieval of multimedia content. The presentation also includes an overview of existing multimedia analysis, annotation and search and retrieval applications.
Contents	PowerPoint Presentation
Literature	
Materials	slides, background papers
Language	English
Comments	Course intended for: *M.Sc. Programme 35 teaching hour(s) available as: F2F course for visiting students, distance course partner is willing to provide it as: F2F course within a university cooperation, distance course within a university cooperation *Community of Practice 3-5 teaching hour(s) available as: learning unit for self-study partner is willing to provide it as: part of summer school, distance course/lecture

Index	22
Origin	REWERSE
Participant	New York
Institution	University of New York, U.S.A.
Contact person	Michael Kifer
Title	Knowledge Base Programming with Frames and Logic
Status	Already offered, last run: January 2004
Course type	Traditional, 12 teaching hour(s)
Intended audience	Master students, PhD students, summer school, researchers
Course page	http://flora.sourceforge.net/tutorial.php
Abstract	FLORA-2 is a knowledge base development platform, which is based on F-Logic, HiLog, and Transaction Logic. It is both a high-level programming language and a specification language. This tutorial covers the foundations of FLORA-2, F-Logic, HiLog, and Transaction Logic, as well as the programming aspects of the system. The tutorial includes lab assignments.
Contents	Part 1: Foundations 1. Introduction 2. Background 2.1 F-logic 2.2 HiLog 2.3 Transaction Logic 2.4 Top-down Execution and Tabling Part 2: Programming 3. Getting Around FLORA-2 3.1 Getting Started 3.2 Modules 3.3 Multifile modules 3.4 Debugging 4. Some Low-level Details 4.1 HiLog vs. Prolog Representation of Terms 4.2 To Table or Not To Table? 5. Advanced Features 5.1 Path Expressions 5.2 Aggregates 5.3 Anonymous OIDs 5.4 Equality 5.5 Control Constructs 5.6 Metaprogramming 6. Updating the Knowledge Base 6.1 Non-logical updates 6.2 Logical Updates 6.3 Limitations 6.4 Inserting and Deleting Rules 7. Future Plans
Literature	Prolog: Bratko, *Prolog Programming for Artificial Intelligence*, Prentice Hall (2nd edition) 1990 D.S. Warren, *Memoing for logic programs*, CACM 1992, http://portal.acm.org/citation.cfm?id=131299&jmp=cit&dl=portal&dl=ACM) Deductive databases: J.D. Ullman, *Principles of Database and Knowledge-base Systems* Vol.I, W.H.Freeman & Co. 1989 F-Logic: M. Kifer, G. Lausen, and J. Wu, *Logical Foundations of Object-Oriented and Frame-Based Languages*, Journal of the ACM 1995 G. Yang and M. Kifer, *Reasoning about Anonymous Resources and Meta Statements on the Semantic Web*, Journal on Data Semantics 2003 HiLog: W. Chen, M. Kifer, D.S. Warren, HiLog *A Foundation for Higher-Order Logic Programming*, Journal of Logic Programming 1993 Transaction Logic: A. Bonner and M. Kife,r *An Overview of Transaction Logic in Theoretical Computer Science*, 1995 A. Bonner and M. Kifer, *A Logic for Programming Database Transactions in Logics for Databases and Information Systems*, Chomicki+Saake (eds), Kluwer 1998 A. Bonner and M. Kifer, *Results on Reasoning about Action in Transaction Logic in Transactions and Change in Logic Databases*, LNCS 1472, 1998
Materials	slides
Language	English
Comments	

Index	23
Origin	REWERSE
Participant	Heraklion
Institution	University of Crete, Greece
Contact person	Grigoris Antoniou antoniou@ics.forth.gr
Title	Knowledge Management on the Web
Status	Already offered, last run: 2003/04
Course type	Traditional, 4 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.csd.uch.gr/~hy566/
Abstract	The course describes the basic Semantic Web technology and some basic applications. The students do two modelling assignments (ontology development in RDFS and OWL) and a term project: development of a useful tool using some kind of SW technology (possibly integrating existing tools).
Contents	Semantic Web vision XML technology: XML, DTD, schemas, XSLT, namespaces, XPath RDF, RDF Schema, Query languages OWL, ontologies, ontology development basics Rules on the Semantic Web, RuleML Applications of SW and ontologies: e-commerce, knowledge management etc.
Literature	G. Antoniou and F. Van Harmelen, *Semantic Web Primer*, The MIT Press 2004
Materials	Project descriptions, course outline
Language	Other
Comments	

Index	24
Origin	Knowledge Web
Participant	Manchester
Institution	The Victoria University of Manchester, UK
Contact person	Ulrike Sattler sattler@cs.man.ac.uk
Title	Knowledge Representation and Reasoning
Status	Already offered
Course type	Traditional, 40 teaching hour(s)
Intended audience	Master students
Course page	http://www.cs.man.ac.uk/Study_subweb/Postgrad/ACS-CS/webpages/syllabus/acs/CS616.html
Abstract	For many applications, specific domain knowledge is required. Instead of coding such knowledge into a system in a way that it can never be changed (hidden in the overall implementation), more flexible ways of representing knowledge and reasoning about it have been developed in the last 10 years. These approaches are based on various extensions of classical logic: modal logic, agents logics, or description logics. They can be used to reason about the terminology of a domain or the behaviour of systems. Computer-based tools can then use this kind of reasoning to support the user. In particular description logics have recently been used as foundational tools for the semantic web.
Contents	A student completing this course unit should: 1) have knowledge and understanding of the syntax and semantics of modal, description, and temporalised description logics, defaults, and formal concept analysis (A) 2) be able to formalise and represent knowledge in these logics and relate questions concerning this knowledge to logical reasoning problems (A and B) 3) have knowledge and understanding of a selection of logic-based applications (A and B) 4) be able to use standard proof systems, in particular Hilbert-style deduction and a translation-based approach for modal logics, subsumption algorithms for description logics, and the attribute exploration algorithm (B) 5) be able to use various systems (SPASS, ICOM) and apply them to solve problems (C)
Literature	
Materials	slides, exercises, lecture notes, background papers
Language	English
Comments	Course intended for: *M.Sc. Programme 40 teaching hour(s) 15 credit points partner is willing to provide it as: F2F course within a university cooperation

Index	25
Origin	Knowledge Web
Participant	Karlsruhe
Institution	Universität Karlsruhe, Germany
Contact person	Max Völkel mvo@aifb.uni-karlsruhe.de
Title	Knowledge management
Status	Already offered
Course type	
Intended audience	PhD students
Course page	http://www.aifb.uni-karlsruhe.de/Lehre/Sommer2004/wm/
Abstract	In a modern enterprise knowledge plays an increasing role in achievement of main goals, such as improvement of the business, product innovation, increase of client satisfaction, strategic planning and many others. Therefore knowledge management is a very important success factor. The lectures discuss different kinds of knowledge relevant in knowledge management, knowledge processes (generation, acquistion, access, and use) and methodologies for introduction of knowledge-based solutions. The focus is on methods of knowledge managment in Intranet environments, in particular on use and querying of knowledge and on navigation in knowledge structures. This includes knowledge modelling and structuring with ontologies, knowledge portals and case studies. The lectures will also introduce basic concepts of data warehousing. Typical knowledge-based applications will also be discussed. The course includes exercise sessions where the presented methods will be applied on concrete examples.
Contents	1. Introduction: what is knowledge management? 2. Ontology-based knowledge management 3. Topic Maps 4. Community of practice 5. Practice lecture 6. Case-based Reasoning (CBR) 7. Data Warehouse
Literature	
Materials	slides, exercises
Language	Other
Comments	Course intended for: *Community of Practice available as: learning unit for self-study

Index	26
Origin	REWERSE
Participant	Turin
Institution	Universita degli Studi di Torino, Italy
Contact person	Alberto Martelli mrt@di.unito.it
Title	Laboratory of Web Applications
Status	Already offered, last run: 2002-2003
Course type	Traditional, 56 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.di.unito.it/~liliana/DIDATTICA/aa04/SERVIZI_WEB/i
Abstract	The course introduces the design and the development of internet services from both a theoretical and pratical point of view. It introduces the technologies for server-side programming and the methodologies for design and development of applications based on modular architectures to access to heterogeneous data sources (relational DB, XML files, etc.). XML has became a standard language for representing and sharing information over the internet and, in particular, for web services. The course introduces mark-up languages and XML as well as programming languages such as ASP and JSP. The laboratory exercise is developed in Java.
Contents	- Markup languages and HTML - Introduction to architecture for web applications - Web browser and Web server; N-Tier applications - WHTML forms - WServer-side programming: CGI, ASP, JSP - WAccess to database: driver ODBC (Open Database Connection) and JDBC - WXML: DTD and XML Schema - WParser SAX, JAXB - WXSLT Laboratory: - Servlets (error handling, session tracking) - JSP - Design and development of a simple application that makes use of JSP, a relational DB
Literature	Wrox Author Team, *Professional Java Server Programming*, Wrox Press Inc. 1999 J. Hunter, *Java servlet programming* (2nd edition), O' Reilly 2001 M. Hall and L.Brown, *Core Servlets and JavaServer Pages. Volume 1: Core technologies* (2nd edition), Prentice Hall PTR 2003
Materials	slides
Language	Other
Comments	

Index	27
Origin	van Harmelen's collection
Participant	n/a
Institution	Vienna University of Technology, Austria
Contact person	Monika Lanzenberger lanzenberger@ifs.tuwien.ac.at
Title	Lectures on Semantic Web
Status	Already offered, last run: Spring 2004
Course type	Traditional
Intended audience	Master students, PhD students, researchers, professionals
Course page	http://www.ifs.tuwien.ac.at/~mlanzenberger/teaching/SS04/Sem
Abstract	At present the contents of web pages can essentially be understood only by humans. The objective of the Semantic Web initiative is to make the structure and the meaning of web information accessible also for machines. For this it is necessary to annotate the web information with metadata. The metadata is to be used by software agents as search criteria or data characteristics. To achieve compatible solutions, W3C is developing standards for the Semantic Web. The keywords relevant in this context include: integration of different datatypes, semistructured data, knowledge management and intelligent information retrieval. The objective of this course is to explain the basic concepts of the Semantic Web, to discuss the ongoing research in the field and to test practical usefulness of the existing tools and applications.
Contents	Introduction to the basic concepts of the Semantic Web XML / RDF / RDF Schema Topic Maps Ontologies Knowledge Management User Interfaces & Interaction in the Semantic Web Visualisation of the semantic stuctures Tools and actual projects on the Semantic Web
Literature	D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*, The MIT Press/Triliteral 2003 A. Swartz, *The Semantic Web In Breadth* T. Berners-Lee, J. Hendler and O. Lassila, *The Semantic Web* and an index of the commonly used notions with explanations.
Materials	slides, articles
Language	Other
Comments	

Index	28
Origin	REWERSE
Participant	Munich
Institution	Ludwig-Maximilians-Universität München, Germany
Contact person	Francois Bry Francois.Bry@ifi.lmu.de
Title	Logic for Computer Scientists
Status	Already offered, last run: Winter 2003/04
Course type	Traditional, 22 to 30 (of 60 min teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.pms.ifi.lmu.de/lehre/logik/03ws04/
Abstract	An application-oriented though formal and demanding introduction to mathematical logic for computer scientists with a strong bias towards knowledge representation, databases, and automated deduction. The course consists of core chapters covering traditional topics of mathematical logic and excursus chapters covering connections to computer science and other advanced topics. Each time the course was given, different parts have been selected or omitted.
Contents	1. Introduction 2. Syntax 2.1 Propositional Logic 2.2 Excursus: Prefix and Postfix Notation and Precedences 2.3 First-order Predicate Logic 2.4 Excursus: Term Representations in Programming Languages and Modelling Languages 2.5 Excursus: Entity-Relation-Model and Tuple Calculus 2.6 Restricted Quantification 2.7 Excursus: Rule Based Formalisms 2.8 First-order Predicate Logic and Natural Language 2.9 Excursus: Many-sorted First-order Predicate Logic 2.10 Excursus: Second-order Predicate Logic 2.11 Excursus: Syntax of Modal and Temporal Logics 3. Semantics 3.1 Booleean Functions 3.2 Excursus: Circuits and Boolean Algebras 3.3 Interpretations and Models of Propositional Formulae 3.4 Excursus: Natural Language Interpretations of Connectives 3.5 Interpretations and Models of First-order Formulae 3.6 Equality 3.7 Excursus: Natural Language Interpretations of Quantifiers 3.8 Herbrand-Interpretations and Skolemization 3.9 Excursus: Relational Datenbases 3.10 The Natural Numbers and the Induction Axiom 3.11 Excursus: Semantics of Modal and Temporal Logics 4. Proof Theory 4.1 What is a Proof Method? What is a Proof? 4.2 Decidability Results for Propositional Logic 4.3 Excursus: Logical Calculi 4.4 Normal Forms 4.5 Excursus: The Davis-Putnam Proof Method 4.6 Decidability Results for First-order Predicate Logic 4.7 Excursus: The PUHR-Tableau Proof Method 4.8 Excursus: Declarative Semantics of Definite Logic Programs 4.9 The Finiteness Theorem (Compactness Theorem) 4.10 Excursus: Finite Entailment 4.11 Non-Expressibility of the Induction Axiom in First-order Predicate Logic
Literature	
Materials	lecture notes
Language	Other
Comments	Well developed lecture notes as PostScript and PDF http://www.pms.ifi.lmu.de/publikationen/lecture-notes/logik/Skriptum.ps In its current version, the course is in German. A translation into English would make sense and could be considered

Index	29
Origin	REWERSE
Participant	Linköping
Institution	Linkpings universitet, Sweden
Contact person	Ulf Nilsson ulfni@ida.liu.se
Title	Logic Programming
Status	Already offered, last run: Fall 2003
Course type	Traditional, 46 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.ida.liu.se/~TDDA41/
Abstract	The aim of the course is to provide foundations for logic and constraint programming and relations to other areas of computer science. The course focuses on both theoretical aspects of logic and constraint programming as well as practical programming in existing systems. One of the main objectives is to convey a declarative view on programming and to practise this knowledge in the programming languages Prolog and CLP(fd). The course also covers relations to grammars, in particular through Definite Clause Grammars, and deductive databases; covering the use of magic transformations for efficient processing of deductive database quesries. The course consists of 12 lectures, 4 problem solving sessions, and 7 labs (each occasion comprising 2 hours of teaching).
Contents	Survey of first order predicate logic, definite programs, Herbrand models, fixed point semantics, unification and SLD-resolution, soundness and completeness of SLD-resolution, negation as failure, SLDNF-resolution, Prolog, cut, Definite Clause Grammars, constraints, CLP(X), finite domain constraints, CLP(fd), deductive databases and query optimization.
Literature	U. Nilsson and J. Maluszynski, *Logic, Programming and Prolog*(2nd edition), Wiley & Sons 1995
Materials	slides, exercises, Electronic book (available free of charge)
Language	English
Comments	

Index	30
Origin	REWERSE
Participant	Turin
Institution	Universita degli Studi di Torino, Italy
Contact person	Alberto Martelli mrt@di.unito.it
Title	Logics for Computer Science
Status	Already offered, last run: 2003-2004
Course type	Traditional, 56 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.di.unito.it/~olivetti/CORSO_LOGICA/ProgrammaLogic
Abstract	
Contents	0) Classical propositional logic (LPC) - Axiomatization, soundness and completeness - Metodo di prova a Tableaux per LPC 1) Modal logics: - Kripke models - Axiomatization for K-systems and its extentions, soundness and completeness - Tableaux 2) Modal logics for representing knowledge 3) Temporal logics for distributed and concurrent systems - Linear temporal logics (LTL) - Model checking - CTL 4) Intuitionistic logic 5) Description Logics
Literature	Basic logic: G. Lolli, *Introduzione alla logica formale*, Il Mulino 1991 Modal logics: M. Fitting, *Proof methods for modal and intuitionistic logics*, D. Reidel 1983 M. G. E. Hughes and M. J. Crewell, *A new introduction to modal logic*, Routledge 1996 Logic for knowledge representation: M. Huth and M. Ryan, *Logic in Computer Science: Modeling and reasoning about systems*, Cambridge University Press 2000 J. Halpern and Y. Moses, *Knowledge and common knowledge in a distributed environment*, Journal of the ACM, 1990 J Meyer and W. van der Hoek, *Epistemic Logic for AI and Computer Science*, Cambridge Tracts in Theoretical Computer Science, Cambridge University Press 1995 Temporal logics: Jost-Pieter Katoen, *Concepts algorithms and tools for model checking*, lecture notes disponibili al sito http://www.diku.dk/topps/activities/model/ D.Peled, *Software Reliability Methods*, Springer-Verlag 2001 M. Huth and M. Ryan, *Logic in Computer Science: Modeling and reasoning about systems*, Cambridge University Press 2000 Intuitionistic logic: Dirk van Dalen, *Intuitionistic Logic*, Handbooks of Philosophical Logic, 1986 Description Logics: F. Baader, *The Description Logic Handbook, Theory, Implementation and Applications*, Cambridge University Press 2003
Materials	lecture notes
Language	Other
Comments	

Index	31
Origin	Knowledge Web
Participant	Universita di Trento
Institution	Universita di Trento, Italy
Contact person	Luciano Serafini luciano.serafini@itc.it
Title	Logics for knowledge representation and reasoning
Status	Already offered
Course type	Traditional, 20 teaching hour(s)
Intended audience	Master students, PhD students
Course page	http://sra.itc.it/people/serafini/teaching/dottorato-dit/2003.html
Abstract	The main objective of this course is to provide a technical overview of the most "famous" logic families and automatic reasoning techniques applied in AI and CS. The level of the course is introductory, for each logic family we will provide, intuitions and applications, the basic syntax and semantics, and its main automatic reasoning techniques. The course does not have any prerequisite, but at each lecture students are supposed to be familiar with the subjects treated in the previous one.
Contents	F2F Lectures
Literature	
Materials	F2F Lectures
Language	English
Comments	It would be possible to make a video of the courseavailable to remote students. In case, it has to be arranged (next academic year) Course intended for: *M.Sc. Programme 20 teaching hour(s) 3 credit points available as: F2F course for visiting students partner is willing to provide it as: F2F course within a university cooperation, distance course within a university cooperation, video of the lectures (visible on a regular browser,see comments) *Community of Practice available as: learning unit for self-study partner is willing to provide it as: distance course/lecture, video of the lectures (visible on a regular browser, see comments)

Index	32
Origin	REWERSE
Participant	Linköping
Institution	Linköpings universitet, Sweden
Contact person	Patrick Lambrix patla@ida.liu.se
Title	Logics for the Web
Status	Already offered, last run: 2003
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, PhD students, summer school, researchers
Course page	http://www.ida.liu.se/labs/iislab/courses/LW/
Abstract	In the emerging Semantic Web (see http://www.semanticweb.org/introduction.html) logic plays an important role. Different logics are proposed for different purposes. The goal of the course is to survey this vision, to give an introduction to the relevant logical formalisms: Description Logics, Horn Clauses and F-Logics and to discuss their proposed uses in the context of the Semantic Web. A major part of the course is devoted to Description Logics as the underlying formalism for ontology description. The course gives the main concepts, surveys some well-known Description Logics and sketches some basic reasoning techniques. The web ontology languages DAML+OIL and OWL are briefly presented and their relation to DL is discussed. The course provides also a brief introduction to Horn logic as a starting point for defining the rule level of the Semantic Web. The proposed approches to integration of rule level with the ontology level are briefly discussed. Frame logic is briefly discussed as an alternative foundation of the Semantic Web. The course consists of 14 hours of lectures and 10 hours of seminars.
Contents	Lectures A vision of the Semantic Web and the role of logics therein (2h) Description Logics: (6h) - Representing knowledge in DL - Reasoning services and algorithms; - Completeness, correctness and complexity; - Description logics and ontologies (DAML+OIL, OWL) - Relations between DL and other KR formalisms. Horn Logic and beyond (6h) - Representing knowledge in Horn clauses, - Reasoning techniques - Rules on the web: is Horn logic sufficient? - Frame-logic Seminars Survey of existing tools and projects, proposed extensions, relations between the formalisms, etc. See the course home page for details.
Literature	Collection of papers, available from the course home page.
Materials	slides
Language	English
Comments	

Index	33
Origin	van Harmelen's collection
Participant	n/a
Institution	Peking University, China
Contact person	William Wei Song wsong@dsv.su.se
Title	Metadata, Ontology and the Semantic Web
Status	Already offered
Course type	Traditional, 42 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.db.pku.edu.cn/sw/
Abstract	This course discusses fundamental concepts of information structure, representation, presentation, as well as information exchange on the World Wide Web. It gives students knowledge of how semantics of the Web information as well as its metadata is formed, structured and represented/presented, and how the Web semantics is acquired and organized so that machines can understand information and assist human being to make better use of the Web information. A few lab works will complement the course for practical understanding of framework of the Semantic Web as well as its design.
Contents	1. Introduction to the Web information and languages 2. Web information and data: its structure and language HTML 3. Presentation and content on the Web: XML and metadata 4. Relationships and Semantics: RDF 5. Conceptual Modelling and languages: Ontology and DAML-OIL 6. Knowledge and knowledge management 7. Machine-understandable information exchange 8. The Semantic Web and its applications: Case Studies
Literature	W. Song and M. Zhang, *A First Step toward the Semantic Web*, Higher Education Press 2004 D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*, The MIT Press/Triliteral 2003 D. Fensel, *Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce*, Springer-Verlag 2001 W. Song, *Metadata and PICS Management*, SISU Report, Sweden 1997 A. Gomez-Perez *et al.*, *Ontological Engineering: With Examples from the Areas of Knowledge Management*, E-Commerce and Semantic Web *XML Schema Part 0: Primer*, W3C Recommendation, 2 May 2001 T. Berners-Lee, *et al.*, *The Semantic Web, Scientific American*, May 2001 *RDF Model & Syntax*, W3C 2001 *OWL Web Ontology Language*, W3C 2003
Materials	articles
Language	English
Comments	

Index	34
Origin	Knowledge Web
Participant	Universita di Trento
Institution	Universita di Trento, Italy
Contact person	Paolo Bouquet bouquet@dit.unitn.it
Title	Models of knowledge representation
Status	Already offered
Course type	Traditional, 35 teaching hour(s)
Intended audience	Master students, PhD students
Course page	
Abstract	I teach how Semantic Web languages can be used to represent different types of knowledge and used to perform different kinds of reasoning. As teaching material, I use the newly published book "A Semantic Web Primer" by G. Antoniou and F. van Harmelen (published by the MIT Press).
Contents	F2F Lectures
Literature	
Materials	F2F Lectures
Language	English
Comments	Course intended for: *M.Sc. Programme 35 teaching hour(s) 5 credit points available as: F2F course for visiting students partner is willing to provide it as: F2F course within a university cooperation

Index	35
Origin	REWERSE
Participant	Naples
Institution	Universita di Napoli, Italy
Contact person	Piero Bonatti bonatti@na.infn.it
Title	Nonmonotonic reasoning and security
Status	Already offered, last run: summer 2001
Course type	Traditional, 12 teaching hour(s)
Intended audience	PhD students, researchers
Course page	
Abstract	An introductory course on nonmonotonic logics, and their application to the specification and enforcement of security policies. Most of the course was devoted to introducing semantics, proof theory and computational complexity of the three main nonmonotonic logics: - Circumscription - Default logic - Autoepistemic logic The properties of these logics have been related to the needs of security policy specification. The course was intended for students with no knowledge of nonmonotonic reasoning, and with a specific background in security and database, including theoretical aspects.
Contents	Semantcs, proof theory, main reasoning tasks and computational complexity of: - Circumscription, - Default logic, - Autoepistemic logic. Applications to modeling open/closed policies, Bell-La Padula, need-to-know principle etc. Policy composition: desiderata, modularization issues, technical solutions based on an embedding of an algebra of policies into logic programming. Implementation issues: partial materialization based on partial evaluation techniques.
Literature	Slides and foundational papers.
Materials	slides, relevant articles
Language	English
Comments	The course was given in Dortmund in 2001

Index	36
Origin	Knowledge Web
Participant	INRIA
Institution	INRIA, France
Contact person	Fabien Gandon Fabien.Gandon@sophia.inria.fr
Title	Ontology in a Nutshell
Status	Already offered
Course type	
Intended audience	Master students, PhD students, professionals
Course page	http://www-sop.inria.fr/acacia/personnel/Fabien.Gandon/research/kmss2002/
Abstract	Short introduction to ontologies in knowledge management and semantic web
Contents	
Literature	
Materials	slides
Language	English
Comments	

Index	37
Origin	Knowledge Web
Participant	INRIA
Institution	INRIA, France
Contact person	Olivier Corby Olivier.Corby@sophia.inria.fr
Title	RDF for the Semantic Web
Status	Already offered
Course type	
Intended audience	Master students, PhD students
Course page	
Abstract	Presentation of RDF and RDF Schema
Contents	
Literature	
Materials	slides
Language	English
Comments	

Index	38
Origin	REWERSE
Participant	Naples
Institution	Universita di Napoli, Italy
Contact person	Piero Bonatti bonatti@na.infn.it
Title	Security and privacy
Status	Already offered, last run: in progress
Course type	Traditional, 48 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://people.na.infn.it/~bonatti/didattica/index.html#SP
Abstract	A broad spectrum introductory course on security and privacy, touching models, policies, languages, exploits based on operating system bugs and network protocols. The course introduces the basic notions and terminology related to policies and models, and touches examples of both static and dynamic policies enforcing non-trivial constraints, such as Chinese Walls. Complex administration policies and recursive revocation are described. Of course, traditional mandatory frameworks (Bell-La Padula) and their realizations (multilevel databases, polyinstantiation techniques) are discussed in depth. Declarative logic-based languages are introduced, and their application as policy description and composition languages is The second part, instead, is of a more technological nature. It describes typical attacks based on operating system bugs and network protocol vulnerabilities.
Contents	The part relevant to REWERSE comprises a 6 hours introduction on logic programming under the stable model semantics and about 4 hours on the applications of (variants of) this language to the formulation and composition of security policies, with classical examples such as Chinese Walls, Bell-La Padula etc. Of course, the first 10-15 hours of the course are essential for providing the notions and the reference policy models needed to understand what needs to be modelled with logic based-languages.
Literature	The basic notions on LPNMR are in the lecture notes (italian). The applications to security policies are illustrated in the slides (italian) and the reference papers.
Materials	slides, lecture notes, relevant articles
Language	Other
Comments	All the material is in Italian, with the exception of the reference articles

Index	39
Origin	REWERSE
Participant	Hannover
Institution	Universität Hannover, Germany
Contact person	Nicola Henze henze@kbs.uni-hannover.de
Title	Semantic Web
Status	Planned, start date: Summer 2004
Course type	Traditional, 24 teaching hour(s)
Intended audience	Master students, summer school, researchers
Course page	http://www.kbs.uni-hannover.de/~henze/semweb04/
Abstract	The amount of information available over the Internet is increasing from day to day. Still, smart technologies for selecting, accessing, and processing information are lacking: Currently, mainly search robots are used that search for available information in the Internet. Access patterns, link information etc. are used to determine the relevance of retrieved information. One of the major issues for improving the way how people interact with the semantic web will be to enable machines to get some understanding of the semantics of the information they process - to create a "semantic web".
Contents	Semantic Web, Metadata, XML Technologies, Taxonomies, Ontologies, RDF,RDF Schema, Web Ontology Languages, Logic and Inference in the Semantic Web, Web Personalization, Recommender- and Filtering Systems,Adaptive Hypermedia.
Literature	G. Antoniou and F. Van Harmelen, *Semantic Web Primer*, The MIT Press 2004 many online resources available via course-website
Materials	slides
Language	Other
Comments	

Index	40
Origin	REWERSE
Participant	Eindhoven
Institution	Eindhoven University of Technology, The Netherlands
Contact person	Gerd Wagner G.Wagner@tm.tue.nl
Title	Semantic Web
Status	Planned, start date: 15 April 2004
Course type	Traditional, 26 teaching hour(s)
Intended audience	Master students, researchers
Course page	
Abstract	The Semantic Web is an initiative of the W3C for advancing the Web. Its main objective is the "semantic" annotation of Web documents for making them accessible to automated interpretation and processing (e.g., by semantic search machines). Semantic annotations represent propositional information, which is expressed by means of XML-based knowledge representation languages (such as RDF, OWL and RuleML/SWRL). In the seminar, we will primarily discuss these languages and the corresponding software tools.
Contents	
Literature	G. Antoniou and F. Van Harmelen, *Semantic Web Primer*, The MIT Press 2004
Materials	slides, exercises
Language	English
Comments	The course is mainly based on the new book by Grigoris Antoniou and Frank van Harmelen, and on the materials they provide on their Web site.

Index	41
Origin	Heraklion's collection
Participant	n/a
Institution	University of Georgia, U.S.A.
Contact person	Amit Sheth amit@cs.uga.edu
Title	Semantic Web
Status	Already offered, last run: 2003
Course type	Traditional, teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://lsdis.cs.uga.edu/SemWebCourse/index.htm
Abstract	Some say Semantic Web will be bigger than WWW. Some consider it to be the next generation of the Web. So what is all the excitement about? What is Semantic Web? Will semantics change the Web forever? Why and how? What are the underpinnings of Semantic Technology? How can Semantic Technology revolutionize how we use web to find and organize information, or conduct business? How can semantics enable next generation data and application interoperability and integration? Will it? What can you get by empowering Web services with semantics? What are Semantic Web Processes? What are research challenges? Are businesses taking notice of it? Will semantics bring new generation of Content Management, will it revolutionize text analytics or content analytics? Semantic Web is turning out to be a multidisciplinary field. Consequently, this is an advanced course involving topics in Internet/WWW, Database Management, Information Systems, Information Retrieval and Artificial Intelligence.
Contents	What is Semantics? Syntax, Structure and Semantics Understanding content: Metadata, metadata standards, XML+metadata specification, RDF and metadata processing Semantic underpinning: Ontology, Domain Modeling, Logic, Inferencing, Context Classification and semantic metadata extraction techniques: statistical, statistical learning/AI, lexical and natural language, knowledge based Specifications: why is XML(S) not adequate? why is RDF(S) not adequate? what is OWL and why is the chosen ontology description language? Semantic Applications - demonstrating power of semantic technology for search, personalization, contextual directory and custom/enterprise applications; next generation semantic content management Research Landscape: review of some of the active projects (e.g., IBM's Web fountain, LSDIS's InfoQuilt and METEOR-S, DAMS-S) and initiatives Commercial Landscape: For example, technologies and products from Semagix/Taalee, Ontoprise, Cyccorp, Applied Semantics, business models today and in future - next generation content management - text analytics, content analytics Technologies, tools and commercial products (e.g., Protege-2000, Semagix Freedom) Research Questions: Contributions of IR, AI, Logic, NLP, DB and IS to Semantic Web, Ontology integration versus interoperation, Broadening the current vision of Semantic Web (beyond machine understandable data) to include modeling of human information and decision making needs
Literature	
Materials	Readings
Language	English
Comments	

Index	42
Origin	Heraklion's collection
Participant	n/a
Institution	University of Amsterdam, The Netherlands
Contact person	Bob Wielinga wielinga@swi.psy.uva.nl
Title	Semantic Web
Status	Already offered, last run: 2003
Course type	Traditional
Intended audience	Master students, researchers
Course page	http://www.swi.psy.uva.nl/semanticweb/
Abstract	An introduction to Semantic Web technology
Contents	XML RDF OWL Ontologies Logic
Literature	
Materials	links to papers
Language	Other
Comments	

Index	43
Origin	Heraklion's collection
Participant	n/a
Institution	Oxford Brookes University, UK
Contact person	Grigoris Antoniou (input, not course delivery) antoniou@ics.forth.gr
Title	Semantic Web
Status	Already offered
Course type	Traditional
Intended audience	Master students, researchers
Course page	http://cms.brookes.ac.uk/computing/courses.php?id=86
Abstract	
Contents	Introduction to Knowledge Representation and Information theory The use of metadata in HTML, negotiation and searching Existing metadata representations (e.g. PICS, P3P, XML Signature) The RDF graph model and RDF Schemas The role of XML in metadata representation The role and creation of ontologies Topic maps Reification and reasoning over metadata Searching and reasoning over distributed and disparate resources
Literature	
Materials	
Language	English
Comments	

Index	44
Origin	Heraklion's collection
Participant	n/a
Institution	Aristotle University of Thessaloniki, Greece
Contact person	Nick Bassiliades nbassili@csd.auth.gr
Title	Semantic Web and Intelligent Agents
Status	Already offered, last run: 2004
Course type	Traditional, 3 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://lpis.csd.auth.gr/mtpx/sw/index.htm
Abstract	
Contents	XML RDF OWL Rules Web services
Literature	
Materials	slides
Language	Other
Comments	

Index	45
Origin	Knowledge Web
Participant	OU
Institution	The Open University, Milton Keynes, UK
Contact person	John Domingue j.b.domingue@open.ac.uk
Title	Semantic Web Services
Status	Planned
Course type	
Intended audience	PhD students, professionals
Course page	
Abstract	Content based on John Domingue's contribution to the Ontoweb Summer School on Semantic Web Services. probably powerpoint slides + exercises for practical work, PhD students mostly, available in 6 months.
Contents	
Literature	
Materials	slides, exercises
Language	English
Comments	Course intended for: *Community of Practice available as: learning unit for self-study partner is willing to provide it as: part of summer school *Education for Professionals available as: learning unit for self-study

Index	46
Origin	van Harmelen's collection
Participant	n/a
Institution	University of New Brunswick, Canada
Contact person	Bruce Spencer Bruce.Spencer@nrc.ca
Title	Semantic Web Techniques
Status	Already offered, last run: Fall 2003
Course type	Traditional
Intended audience	Master students, researchers
Course page	http://www.cs.unb.ca/~bspencer/cs6905swt/syllabus.html
Abstract	The Semantic Web is a W3C Activity for representing information in the World Wide Web in a machine-readable fashion: such that it can be used by machines not just for display purposes, but for automation, integration, and reuse across applications. This course introduces techniques that are useful stand-alone and can be integrated for building a semantic web.
Contents	The Semantic Web Activity of W3C: Overview of techniques and standards. XML with Document Type Definitions and Schemas Transformation/Inference rules in XSLT and RuleML Metadata with RDF (Resource Description Framework) Metadata taxonomies with RDF Schema. The proposed W3C ontology language OWL. Integrating these techniques for high-precision search engines.
Literature	D. Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*, The MIT Press/Triliteral 2003 I. Horrocks and J. A. Hendler (Eds.), *The Semantic Web*, ISWC 2002 (proceedings), Springer-Verlag, Lecture Notes in Computer Science 2342, http://link.springer-ny.com/link/service/series/0558/tocs/t2342.htm E. R. Harold, *XML Bible* (2nd edition), Hungry Minds, NY 2001 Especially Chapter 17: *XSL Transformations*, http://www.ibiblio.org/xml/books/bible2/chapters/ch17.html, and Chapter 24: *Schemas*, http://www.ibiblio.org/xml/books/bible2/chapters/ch24.html. J.Hjelm, *Creating the Semantic Web with RDF*, John Wiley & Sons 2001
Materials	exercises, articles
Language	English
Comments	

Index	47
Origin	Heraklion's collection
Participant	n/a
Institution	University of Illinois at Chicago, U.S.A.
Contact person	Isabel Cruz ifc@cs.uic.edu
Title	Semantic Web: Models and Query Languages
Status	Already offered, last run: 2002
Course type	Traditional, 4 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.cs.uic.edu/~ifc/594-SW.html
Abstract	The course aims to prepare students to undertake research in the important subjects that comprise the new Semantic Web research area. Subjects will be introduced by the instructor and by the students in their presentations to the class. The project will be representative of current research and development in the Semantic Web area. Because of the research nature of the course, it is best suited for advanced graduate students.
Contents	Data models XML RDF Logic-based query languages, Datalog Ontologies F-Logic Visualization for the Semantic Web
Literature	J.Hjelm, *Creating the Semantic Web with RDF*, John Wiley & Sons 2001 S. Abiteboul, D. Suciu and P. Buneman, *Data on the Web: From Relations to Semistructured Data and XML*, Morgan Kaufmann C. Delobel, C. Lecluse and P. Richard, *Databases: From Relational to Object-oriented Systems*, International Thomson Computer Press 1995 D.C. Tsichritzis and F.H. Lochovsky, *Data Models*, Prentice Hall 1982 F. Sowa, *Knowledge Representation*, Brooks/Cole 2000 D. Fensel, *Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce*, Springer-Verlag 2001
Materials	Group project outcomes
Language	English
Comments	

Index	48
Origin	REWERSE
Participant	Vienna
Institution	Vienna University of Technology, Austria
Contact person	Robert Baumgartner baumgart@dbai.tuwien.ac.at
Title	Semistructured Data
Status	Already offered, last run: Winter 2003
Course type	Traditional, 2 per week teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.dbai.tuwien.ac.at/staff/baumgart/semi/
Abstract	Semistructured data models Object Exchange Model OEM XML Family DTD XSD XLink XPointer XSLT XML-based standards Query Languages Lorel XQuery XQL XML APIs, web data extraction wrapper generation mediation systems web data integration web services basics semantic web basics
Contents	Semistructured data models, Object Exchange Model OEM, XML Family (XML, DTD, XSD, XLink,...), XSLT, Query Languages(Lorel, XQuery, XQL, ...), XML APIs, web data extraction, wrapper and mediation systems
Literature	
Materials	slides
Language	Other
Comments	

Index	49
Origin	REWERSE
Participant	Göttingen
Institution	Universität Göttingen, Germany
Contact person	Wolfgang May may@informatik.uni-goettingen.de
Title	Semistructured Data and XML
Status	Already offered, last run: Summer 2003
Course type	Traditional, 50 teaching hour(s)
Intended audience	Master students, summer school, researchers
Course page	http://www.dbis.informatik.uni-goettingen.de/Teaching/SSD
Abstract	One of the most important facts that lead to the overall success of XML is that the "XML world" combines a lot of already known concepts in an optimal way for coping with a broad spectrum of requirements. The course will first review some of these preceding (partially even historic) concepts (network database model, relational databases, object-orientierted databases) and the integration of data and metadata (SchemaSQL). Then, the idea of "semistructured data" is introduced by showing early representatives that helped to shape the XML world (F-Logic, OEM). In the main part, XML is presented as a data model and a markup-meta-language, and the current languages of the concepts of the XML world are systematically investigated and applied: XPath, XQuery, XSLT, XLink, XML Schema etc.
Contents	Concepts of the XML world (theory and practice).
Literature	Optional: K.B.Sall, *XML Family of Specifications*, Addison-Wesley 2002 D. Chamberlin, *et al.*, *XQuery from the Experts: A guide to the W3C XML Query Language*, Addison-Wesley 2003
Materials	slides, exercises
Language	English
Comments	The course has been given in german in SS03 and will be given in englisch in SS04 (4 hrs lecture + 2 hrs theoretical/practical exercises). Planned for 2005: 3+1 hrs lecture + separate lab 2+4

Index	50
Origin	REWERSE
Participant	Dresden
Institution	Technische Universität, Dresden, Germany
Contact person	Michael Schroeder ms@mpi-cbg.de
Title	Software Agents
Status	Already offered, last run: 2002
Course type	Traditional, 10 teaching hour(s)
Intended audience	Master students, researchers
Course page	
Abstract	The module introduces software agents and covers their architecture, components such as planning, learning, and negotiation, as well as applications such as information agents
Contents	Agent Infrastructure: Agent Architectures based on chapter 1 of Weiss. Multi-agent system. Mobile Agents Back up material: James White. Mobile Agents. Chapter 19 in J.Bradshaw (ed.), Sofware Agents, MIT Press, 1997 Components of Agents Planning based on Chapter IV of Russell and Norvig. AI - A modern approach Learning based on Chapter VI of Russell and Norvig. AI - A modern approach Coordination of Agents Agent Communication based on chapter 2 of Weiss. Multi-agent system. Market-based Computing based on chapter 5 of Weiss. Multi-agent system and on Michael Schroder. http://www.soi.city.ac.uk/~msch/abstracts/sch_maamaw99.html An efficient argumentation framework for negotiating autonomous agents. In Proceedings of the workshop on Modelling Autonomous Agents in a Multi-Agent World MAAMAW99. Valencia, Spain, Springer-Verlag, July 1999. You may also wish to have a look at S. Kraus and K. Sycara and A. Evenchik. Reaching agreements through argumentation: a logical model and implementation. Artificial Intelligence. 1998. To appear. Applications: Information agents
Literature	Weiss, *Multi-agent system*, Russell & Norvig, AI papers
Materials	slides
Language	English
Comments	

Index	51
Origin	REWERSE
Participant	Lisbon
Institution	Universidade Nova de Lisboa, Portugal
Contact person	Joaquim Aparicio jna@di.fct.unl.pt
Title	Technologies of the Web based Information Systems
Status	Already offered, last run: 1st semester 03/04
Course type	Traditional, 30 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.di.fct.unl.pt/mei0304/docdisciplinas/tsibw/
Abstract	This course describes XML based technology for representing hierarchical and semi-structured data, and related W3C recommendations: XML Schemas, XML Namespaces, and XML Base. The text-centered and data-centered documents views are discussed and compared. XML data model integrity supporting mechanisms are analysed, namely XLink, XPointer and XML Inclusions. Querying and transformation languages for XML documents are described and deeply studied, in particular XSL based-languages (XPath and XSLT) and the more recent XQuery. The course continues by relating the database relational model (DBMSs) with the hierarchical model (XML), and studying the mappings between them. The course continues by presenting client-server architectures integrating XML and relational databases, as well as XML support in the major DBMSs. The course concludes with DOM and SAX programming techniques, and construction of Web Services using SOAP.
Contents	The course web page is not for the moment available due to a disk problem. Check with the contact person for more information please.
Literature	
Materials	
Language	English
Comments	This course is being offered in English in the new MSc in Computational Logic, starting September 04. Cf. http://centria.di.fct.unl.pt/~lmp/mestrado

Index	52
Origin	van Harmelen's collection
Participant	n/a
Institution	University College Dublin, Ireland
Contact person	Nick Kushmerick nick@ucd.ie
Title	The Intelligent Internet
Status	Already offered
Course type	
Intended audience	researchers
Course page	http://www.cs.ucd.ie/courses/undergrad/bsc/FourthYear/cs4-16
Abstract	The Internet has given rise to a powerful new "information ecosystem", with inexpensive global access to an endless variety of information repositories. But the decentralized and frenetic nature of the Internet has resulted in acute information overload, with users unable to find what they're looking for without manually trawling through thousands of possible relevant Web pages. At the same time, the sheer quantity and variety of available information has lead to entirely new kinds of information services and applications. With its focus on heuristic algorithms, knowledge representation, uncertainty processing, and learning, Artificial Intelligence techniques have come to play an important role in both taming and pushing the envelope of the Internet. This course will use recent technical research articles to introduce the main techniques and approaches currently being investigated. Topics covered include: machine learning, text classification, clustering, informa! tion-retrieval, -extraction and -integration, and ontologies.
Contents	
Literature	
Materials	
Language	English
Comments	

Index	53
Origin	Heraklion's collection
Participant	n/a
Institution	Lehigh University, Bethlehem, U.S.A.
Contact person	Jeff Heflin heflin@cse.lehigh.edu
Title	The Semantic Web
Status	Already offered, last run: 2003
Course type	Traditional, 4 teaching hour(s)
Intended audience	Master students, researchers
Course page	http://www.cse.lehigh.edu/~heflin/courses/semweb/
Abstract	The Internet is on the verge of another revolution. The development of the World Wide Web made the Internet accessible to millions by making it easy for anyone to publish and access documents on the Internet. However, the explosive growth of the Web has led to the problem of information overload. Researchers from industry and academia are now exploring the possibility of creating a "Semantic Web," in which meaning is made explicit, allowing machines to process and integrate Web resources intelligently. Beyond enabling quick and accurate web search, this technology may also allow the development of intelligent internet agents and facilitate communication between a multitude of heterogeneous web-accessible devices. In this class, we will examine this exciting area by reading and discussing both existing web specifications and cutting-edge research papers. Topics will include the design of various Semantic Web languages (such as XML, RDF, SHOE, DAML+OIL and OWL), the ! role of ontologies, and issues in developing semantic-aware applications.
Contents	
Literature	Fensel *et al*(eds.), *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential* 2003, The MIT Press/Triliteral 2003
Materials	slides, exercises
Language	English
Comments	

Index	54
Origin	van Harmelen's collection
Participant	n/a
Institution	Semantic Web and Agents Research, Maryland, U.S.A.
Contact person	Jim Hendler hendler@cs.umd.edu
Title	The Semantic Web
Status	Already offered, last run: Spring 2004
Course type	Traditional
Intended audience	researchers
Course page	http://www.mindswap.org/2004/cmsc498w/
Abstract	
Contents	Knowledge Representation, DL reasoning, Ontologies, RDF(S), OWL, Web Services
Literature	
Materials	slides, exercises, articles
Language	English
Comments	

Index	55
Origin	KnowledgeWeb, REWERSE
Participant	Manchester
Institution	The Victoria University of Manchester, UK
Contact person	Ian Horrocks horrocks@cs.man.ac.uk
Title	The Semantic Web: Ontologies and OWL
Status	Already offered, last run: 2003
Course type	Traditional, 30 teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.cs.man.ac.uk/~horrocks/Teaching/cs646/
Abstract	Knowledge representation and "ontologies" are becoming critical to the development of the next generation Web ("The Semantic Web" and "meta data"). The course will present the knowledge representation paradigms used in a variety of applications including current research in the department in "E-Science" and theWeb. Describing web resources with metadata expressed using ontologies is a key step towards achieving effective 'agent based' applications to automate web operations.

Contents	- Introduction to the Semantic Web (PPT)
	- Ontology Languages for the Semantic Web (PPT)
	- An Introduction to Description Logics (PPT)
	- Reasoning with OWL - Why did that happen? (PPT)
	- Description Logic Reasoning - How did that happen? (PDF)
	- Advanced Reasoning Techniques (PDF)
	- Ontology Building
	  - Introduction (PPT)
	  - Existentials and Universals (PPT)
	  - Classes, Instances, Concepts & Individuals (PPT)
	  - Definitions, Descriptions, Restrictions & Axioms (PPT)
	  - Ontology Patterns & Top Ontologies (PPT)
	  - Ontology Patterns Parts and Wholes (PPT)
	  - Representing Time & Space (PPT)

Literature	T. Berners-Lee, J. Hendler and O. Lassila, *The Semantic Web*, Scientific American, May 2001. D. McGuinness, *Ontologies Come of Age. The Semantic Web: Why, What and How*, MIT Press 2001 (PS, MS-Word) M. Uschold, R. Jasper, *A Framework for Understanding and Classifying Ontology Applications*, KRR5-99, Sweden, 1999 F. Baader, I. Horrocks and U. Sattler, *Description logics as ontology languages for the semantic web*, Lecture Notes in Artificial Intelligence, Springer 2003. I. Horrocks, P. F. Patel-Schneider, F. van Harmelen, *From SHIQ and RDF to OWL: The making of a web ontology language* A. L. Rector, Ch. Wroe, J. Rogers and A. Roberts, *Untangling Taxonomies and Relationships: Personal and Practical Problems in Loosely Coupled Development of Large Ontologies*
Materials	slides, exercises
Language	English
Comments	

Index	56
Origin	REWERSE
Participant	Heraklion
Institution	University of Crete, Greece
Contact person	Vassilis Christophides christop@ics.forth.gr
Title	Web Data Management
Status	Already offered, last run: Spring 2003
Course type	Traditional, 6h per week teaching hour(s)
Intended audience	Master students, PhD students, researchers
Course page	http://www.csd.uch.gr/~hy561/
Abstract	The goal of this course is to expose students to advanced database topics that show how post-modern database systems have been extended from the standard relational model to deal with more complex kinds of data on the Web. In particular, CS561 will present the state of the art of current research directions in semistructured and XML databases representing the convergence of three distinct until nowdays cultures in information management: (a) everything is a document (i.e., the Web), (b) everything is a table (i.e., the Relational databases) and (c) everything is an object (i.e., Object Programming Languages). In summary, the goals of CS561 are as follows: What the database community has done: Semistructured data model: SSD-exps, labeled graphs Schema/Typing, Storage, Query Optimization What the Web community has done: Data formats and APIs: XML 1.0, DOM Transformation and Stylesheet languages (XSLT/XSL) Where they meet and where they differ Comparison to relational and object-oriented data models Present emerging XML technology as a data management issue XML Data models XML Data Definition (Schema) Languages XML Data Manipulation (Query) Languages Students completing this course are expected to acquire the required skills in XML Information Management both from a research and a system development perspective
Contents	Web Data Management:An Introduction to Semistructured and XML Databases Semistructured Data XML XML Schema Schema Formalisms and Type Systems for Semistructured Data Intro to XQuery XQuery Typing Semistructured & XML Data Manipulation Languages
Literature	S. Abiteboul, D. Suciu and P. Buneman *Data on the Web: From Relations to Semistructured Data and XML*, Morgan Kaufmann 2000 D. Chamberlin *et al.*, *XQuery from the Experts: A guide to the W3C XML Query Language*, Addison-Wesley 2003 A. B. Chaudhri, A. Rashid and R. Zicari, *XML Data Management: Native XML and XML-Enabled Database Systems*, Addison-Wesley 2003
Materials	slides, exercises
Language	English
Comments	

Index	57
Origin	Knowledge Web
Participant	Vrije Universiteit Amsterdam
Institution	Vrije Universiteit Amsterdam, The Netherlands
Contact person	Frank van Harmelen Frank.van.Harmelen@cs.vu.nl
Title	Web-based Knowledge Representation
Status	Already offered
Course type	Traditional, 82 teaching hour(s)
Intended audience	Master students
Course page	http://www.cs.vu.nl/~frankh/webkr.html http://www.semanticwebprimer.org
Abstract	The WWW offers a great opportunity for using well-established and new knowledge representation techniques.The aim in using these is to make web pages intended for human users accessible for machines as well. Such a web would enable a set of intelligent services such as: search-engines, information filters, adaptive websites a.s.o. This course presents the technology that enables the new generation of the web. It presents knowledge modeling concepts (ontologies) and knowledge representation languages developed for the web (XML, RDF, OWL). We investigate the increasing expressiveness of these languages and point out issues for future research in this field.
Contents	1. The Semantic Web: an introduction + Ontologies I 2. Ontologies II 3. XML and related techniques 4. RDF and RDF Schema 5. Querying RDF 6. OWL (beyond RDF Schema) 7. Graphical applications; Stylesheets, XSL 8. Further applications
Literature	G. Antoniou and F. Van Harmelen, *Semantic Web Primer*, The MIT Press 2004
Materials	slides, exercises, background papers
Language	English
Comments	stable course material, in use for 3 years The course ends with a large practical exercise for the students (1 month full-time work) Course intended for: *M.Sc. Programme 82 teaching hour(s) 6 credit points available as: F2F course for visiting students, self-study course partner is willing to provide it as: F2F course within a university cooperation

Index	58
Origin	REWERSE
Participant	Munich
Institution	Ludwig-Maximilians-Universität München, Germany
Contact person	Francois Bry Francois.Bry@ifi.lmu.de
Title	XML and Databases
Status	Already offered, last run: Summer 2003, Summer 2004
Course type	Traditional, 25 (of 60 min each) teaching hour(s)
Intended audience	Master students, PhD students, industrial, researchers
Course page	http:///www.pms.ifi.lmu.de/lehre/markupsemistrukt/04ss/
Abstract	This course aims at introducing into techniques and methods related to XML and databases that have been developed during the last years, some of which are still the subject of active research. The course will give an introduction to XML basics, to formalisms for specifying XML data schemas, to query and transformation languages for XML, and to indexing methods for XML data. The course will also present research results on some of these issues recently obtained at the University of Munich. No specific knowledge in document management and/or in database systems is assumed.
Contents	A. XML Basics (slide) 1. Markup Languages: Origins and Typology 1. "Mark up" vs. "Markup" 2. Purposes of Markup Languages 3. Kinds of Markup Languages 2. Structure of an XML Document 1. Document Prolog 2. Elements 3. Document Tree 4. Attributes 5. Resources, Entities, and Notations 6. Character Set 3. XML vs. SGML 4. XML vs. HTML 5. References B. Data Type Specification (slide) 1. Features of Standard Data Models: indispensable, exceptions excluded, and not self-explanatory 2. Advantages of Dispensable Data Schemas and Self-Explanatory Data 3. Semistructured Data 4. DTD 1. Introduction 2. Markup Declarations 3. Composition of a DTD 4. Namespaces 5. Well-Formed vs. Valid XML Documents 6. Expressive Power of DTD 5. XML Schema 1. Introduction 2. Built-in Simple Types of XML Schema 3. Simple Type Definitions 4. Complex Types Definitions 5. Further Features 6. References C. Query and Transformation Languages for XML (slide) 1. Need for Transformations 2. Data Selection with XPath 1. Regular Path Expressions 2. XPath 3. XPointer 3. The Transformation Language XSLT 1. XSLT Basics 2. The Recursive Computation Model of XSLT 3. The Imperative Computation Model of XSLT 4. Further Constructs 4. The Query Language XQuery 1. Origin of XQuery 2. XQuery Principles 5. Xcerpt: Querying XML Data Reconsidered 6. References D. Indexing XML Data
Literature	
Materials	lecture notes
Language	English
Comments	Lecture notes as XHTML pages: http://www.pms.ifi.lmu.de/publikationen/lecture-notes/xml-databases/contents.html Three chapters are completed, the last chapter needs more work, the completion of which is expected for mid 2004.

B.2 Short courses

Index	1s
Origin	Knowledge Web
Participant	Universita di Trento
Institution	Universita di Trento, Italy
Contact person	Marco Ronchetti marco.ronchetti@unitn.it
Title	A three hour introduction to XML
Status	Already offered
Course type	Traditional, 3 teaching hour(s)
Intended audience	Master students
Course page	http://latemar.science.unitn.it/Didattica/aa_2003_2004/ Web_Programming/Settimana1/0pre01-XML.pdf
Abstract	Slides of a lecture on XML
Contents	Slides
Literature	
Materials	slides, F2F Lectures
Language	English
Comments	It would be possible to make a video of the courseavailable to remote students. In case, it has to be arranged (next academic year) Course intended for: *M.Sc. Programme 3 teaching hour(s) available as: F2F course for visiting students partner is willing to provide it as: F2F course within a university cooperation, distance course within a university cooperation, video of the lectures (visible on a regular browser,see comments) *Community of Practice 3 teaching hour(s) available as: learning unit for self-study partner is willing to provide it as: distance course/lecture, video of the lectures (visible on a regular browser, see comments)

Index	2s
Origin	van Harmelen's collection
Participant	n/a
Institution	Techquila , UK
Contact person	Kal Ahmed kal@techquilla.com
Title	An Introduction to Semantic Web Technologies
Status	Already offered
Course type	Traditional
Intended audience	industrial, researchers
Course page	http://www.techquila.com/train-semweb.html
Abstract	This half-day course provides a basic overview of the concepts behind the Semantic Web. As well as looking to the future of the Web, this course focusses on the application of those elements of Semantic Web technology which it is practical to implement and make use of today; and on how these technologies can improve the current Web experience for users. The course is non-technical in content and suitable for XML developers; content creators; and managerial users seeking to get a broad overview of this rapidly developing aspect of the Web.
Contents	- What the Semantic Web is - How meta data is the foundation of the Semantic Web - How ontologies will unify web-based applications and information - Some Semantic Web technologies you never expected were Semantic Web technologies. - What RDF is. - What Topic Maps are. - How to begin the implementation of Semantic Web technologies in a business
Literature	
Materials	
Language	English
Comments	

Index	3s
Origin	Knowledge Web
Participant	Universita di Trento
Institution	Universita di Trento, Italy
Contact person	Marco Ronchetti marco.ronchetti@unitn.it
Title	Brief introduction to ANT
Status	Already offered
Course type	Traditional, 1 teaching hour(s)
Intended audience	Master students
Course page	http://latemar.science.unitn.it/Didattica/aa_2003_2004/ Web_Programming/Settimana2/1pre02-ANT.pdf
Abstract	An introduction to ANT - a Java-based build tool. In theory, it is kind of like Make, without Make's wrinkles and with the full portability of pure Java code.
Contents	1) What is ANT? 2) Installing ANT 3) Testing ANT 4) Directory structure 5) ANT in XML 6) Project
Literature	
Materials	slides, F2F Lectures
Language	English
Comments	It would be possible to make a video of the courseavailable to remote students. In case, it has to be arranged (next academic year) Course intended for: *M.Sc. Programme 1 teaching hour(s) available as: F2F course for visiting students partner is willing to provide it as: F2F course within a university cooperation, distance course within a university cooperation, video of the lectures (visible on a regular browser,see comments)

Index	4s
Origin	Knowledge Web
Participant	Universita di Trento
Institution	Universita di Trento, Italy
Contact person	Marco Ronchetti marco.ronchetti@unitn.it
Title	Brief introduction to JNDI
Status	Already offered
Course type	Traditional, 1 teaching hour(s)
Intended audience	Master students
Course page	http://latemar.science.unitn.it/Didattica/aa_2003_2004/ Web_Programming/Settimana2/1pre04-JNDI.pdf
Abstract	An introduction to JNDI - Java naming and directory interface
Contents	1) Naming service 2) Directory service 3) JNDI concepts 4) Archtecture 5) Operations on a JNDI context
Literature	
Materials	slides, F2F Lectures
Language	English
Comments	It would be possible to make a video of the courseavailable to remote students. In case, it has to be arranged (next academic year) Course intended for: *M.Sc. Programme 1 teaching hour(s) available as: F2F course for visiting students partner is willing to provide it as: F2F course within a university cooperation, distance course within a university cooperation, video of the lectures (visible on a regular browser,see comments)

Index	5s
Origin	REWERSE
Participant	LibRT
Institution	LibRT, The Netherlands
Contact person	Silvie Spreeuwenberg silvie@librt.com
Title	Introduction to business rules
Status	Planned, start date: april
Course type	Traditional, 4 teaching hour(s)
Intended audience	industrial, researchers
Course page	n/a
Abstract	This tutorial gives an introduction on what business rules are and on the techniques that stand behind the Business Rules Approach. In the presentation the relationship between the Business Rules Approach and other OMG initiatives such as UML 2.0 and MDA as well as the current state of the two RFP's is discussed. The presentation will be complemented with real world examples of business rules applications.
Contents	At the end of the tutorial, attendees will be able to assess in what respect the business rules approach increases the agility of an organization. Organisations that already automate business rules in traditional procedural code, database environments or web-based applications will learn how the cost of maintenance and support on the rules in your organizations can be decreased in the long run. The tutorial will discuss how business rules can be implemented in your organisation to meet this objective in an optimal way.
Literature	
Materials	slides
Language	English
Comments	

Index	6s
Origin	Knowledge Web
Participant	Free University Berlin
Institution	Freie Universität Berlin, Germany
Contact person	Prof. Dr. Robert Tolksdorf tolk@inf.fu-berlin.de
Title	Semantic Web Information Day
Status	Already offered
Course type	
Intended audience	professionals
Course page	http://swit.xml-clearinghouse.de/1/
Abstract	The Information Day gives an overview of the fundamental concepts and technologies of the Semantic Web. It enables you to incorporate the buzzword "Semantic Web" into your lexicon. Furthermore it gives you an opportunity to evaluate the meaning of the Semantic Web for your existing and future projects
Contents	Overview of the Semantic Web; Standards around the Resource Description Framework; Ontologies; Applications, Current Research and Future Vision.
Literature	
Materials	slides
Language	Other
Comments	Course intended for: *Education for Professionals available as: learning unit for self-study partner is willing to provide it as: professional training