



Programma del Corso integrato "Autonomous Networks"

Il corso e' composto da 2 moduli: 1) Non-cooperative networks, 2) Social Networks

Programma del Modulo "Non-cooperative networks"

- Codice: DT0174
- Tipo di corso: Obbligatorio (Laurea Magistrale in Informatica percorso NEDAS), Opzionale (Laurea Magistrale in Informatica percorso SEAS), Opzionale (Laurea Magistrale in Informatica percorso UBIDIS)
- Livello del corso: Lauree Magistrali
- Semestre: 1

Numero di crediti ECTS: (Laurea Magistrale in Informatica) 3 (carico 75 ore)

Docenti: Guido Proietti (Guido.Proietti@univaq.it)

1	Obiettivi del corso	Il corso si focalizza sugli aspetti algoritmici delle rete non cooperative, in cui i processori sono agenti autonomi egoistici. In tale scenario vengono analizzati diversi problemi di progetto e ottimizzazione di reti di comunicazione, e se ne studiano le proprietà degli spazi degli equilibri, nonché di progettazione algoritmica di meccanismi implementativi.
2	Contenuti del corso e risultati formativi (descrittori di Dublino)	<p>Gli argomenti trattati nel corso comprendono:</p> <ul style="list-style-type: none"> • Teoria degli equilibri strategici in Reti Non-Cooperative: Equilibri di Nash ed equilibri in strategie dominanti. Selfish routing, Network Design games, Network Creation games • Teoria dell'implementazione in Reti Non-Cooperative: Algorithmic mechanism design (AMD). AMD per alcuni classici problemi di progettazione di reti: Shortest path, Minimum Spanning Tree, Shortest-path Tree <p>Alla fine del corso, lo studente dovrebbe:</p> <ul style="list-style-type: none"> • By the end of this module students will be able to understand the difference between a canonical and a strategic distributed system. • The aim is to make the student capable of abstracting models and formal algorithmic problems from real (i.e. non-cooperative) distributed computational problems, and designing efficient algorithmic solutions. • Through the presentation and the comparison of different solutions to a given problem, students will be guided to learn and to identify independently their most efficient solution. • The course will encourage the development of the following skills of the student: capability of formally presenting and modelling concrete problems, focusing on their main features and discarding the inessential ones. • The course aims to develop in graduate students competencies and abilities necessary in their future studies, especially with respect to doctoral studies on algorithmic topics.
3	Prerequisiti	Conoscenza degli argomenti trattati nei corsi di matematica discreta e di algoritmi e strutture dati.
4	Modalita' e lingua di insegnamento	<p>Lezioni</p> <p>Lingua: Inglese</p> <p>Testi/Bibliografia</p> <ul style="list-style-type: none"> • Noam Nisan, Tim Roughgarden, Eva Tardos, and Vijay V. Vazirani, Algorithmic Game Theory. Cambridge University Press. 2011.
5	Metodi di accertamento	Prova parziale scritta + Prova finale orale (eventualmente limitata alla seconda parte del corso nell'eventualità che sia stata superata con successo la prova parziale).

Programma del Modulo "Social Networks"

- Codice: DT0175
- Tipo di corso: Obbligatorio (Laurea Magistrale in Informatica percorso NEDAS)
- Livello del corso: Lauree Magistrali
- Semestre: 1

Numero di crediti ECTS: (Laurea Magistrale in Informatica) 3 (carico 75 ore)		
Docenti: Gianpiero Monaco (gianpiero.monaco@univaq.it)		
1	Obiettivi del corso	The course investigates how the social, technological, and natural worlds are connected, and how the study of graphs and networks sheds light on these connections. Particular topics include: how opinions, fads, and political movements spread through society, the theory behind strong and weak ties in relationships, and the small-world phenomenon. Students will learn to use models and theory to explain and exploit the structure of information and social networks.
2	Contenuti del corso e risultati formativi (descrittori di Dublino)	Gli argomenti trattati nel corso comprendono: <ul style="list-style-type: none"> The (tentative) schedule of the course is the following (with respect to the chapters of the textbook): Ch. 1 of the textbook: overview; Ch. 2 of the textbook: Graphs; Ch. 3 of the textbook: Strong and Weak Ties; Ch. 4 of the textbook: Networks in their Surrounding Contexts; Ch. 5 of the textbook: Positive and Negative Relationships; Part of Ch. 12 of the textbook: Bargaining and Power in Networks; Ch. 18 of the textbook: Power Laws and Rich-Get-Richer Phenomena; Ch. 19 of the textbook: Cascading Behavior in Networks; Ch. 20 of the textbook: The Small-World Phenomenon.
3	Prerequisiti	Students should have general knowledge of: Discrete Mathematics, Probability, Computer Networks, Algorithms and Complexity.
4	Modalita' e lingua di insegnamento	Lectures and exercises. Lingua: Inglese Testi/Bibliografia <ul style="list-style-type: none"> David Easley, Jon Kleinberg., Networks Crowds and Market: Reasoning about a highly Connected World. Cambridge Press. 2010.
5	Metodi di accertamento	Written test followed by an optional oral exam. The oral exam can be required either by the student, to improve grades, or by the teacher, in presence of significant mistakes/misunderstandings in the written exam. The written test is aimed at: (1) verification of theoretical competence, and in particular of knowledge and comprehension of Course contents (2) verification of skills in understanding and solving significant exercises, and in explaining the proposed solutions. This in order to verify the ability of application of techniques learnt during the Course, of analysis of problems and synthesis of suitable solutions, and of evaluation of alternative solutions. Criteria of evaluation will be: the level of knowledge and practical ability; the property of use of the technical/mathematical language; the clarity and completeness of explanations. The written test (about 2 hours) consists in: (i) Short essays and open questions to cover point (1), 30-50% of total marks; (ii) Exercises, to cover point (2), 50-70% of total marks. All parts can result in negative marks if the answer is omitted or seriously flawed. The oral exam (max 1 hour) will occur within the same exam session of the written test and will typically cover the areas of the written answers that need clarification plus, possibly, additional subjects proposed by the teacher.