Ca’ Foscari University of Venice

Prof. Agostino Cortesi
Dipartimento di Informatica

Cracow, January 29, 2010
Ca’ Foscari and the City of Venice

Venice is a crossroads of exchange and international contacts, of languages from all corners of the world, and of trade – it is both tradition and modernity.

It offers a unique experience that creates unforgettable cultural inspiration.
Ca’ Foscari University and the City of Venice
Locations

Faculty of Economics - San Giobbe

Faculty of Humanities – Palazzo Malcanton Marcorà

Faculty of Mathematical, Physical and Natural Sciences - Santa Marta

Faculty of Foreign Languages and Literatures – San Sebastiano
The origins of the Faculty of Mathematical Physical and Natural Sciences go back to the Faculty of Industrial Chemistry, which was founded in the Seventies.

Today the fields of study have expanded rapidly, resulting in three main areas: chemistry, with particular attention to new materials and green chemistry, environmental science and computer science (since 1990).
The Faculty of Foreign Languages and Literatures is one of the oldest in Italy and it is also the only one to offer such a broad range of Western and Eastern languages, almost 40, all with their own syllabuses following different lines of study: literary-philological, linguistic-foreign language teaching, cultural-historical, artistic, for tourism or archaeological-artistic and philosophical-religious.
Faculty of Foreign Languages and Literatures
Faculty of Economics

The Faculty of Economics is one of the most prestigious in Italy, boasting a great tradition in the field of economics and business studies.

Today the Faculty teaches general economics (theory, methods and models, economic policies and applied economics), law, business administration and management, as well as mathematics and statistics. Particular areas and problems are studied such as tourism, foreign trade, the application of computer science and statistics to business management.
Faculty of Letters

The traditional range of studies in the Faculty includes the degree courses in Literature, History and Philosophy with the addition, in the last few years, of other courses of a social and artistic nature as well as in the conservation of architectural and cultural heritage.
University Libraries

The university library system has recently been restructured. There are 4 libraries for the following fields:

- Economics, Science, Languages and Humanities
  - the Economics Library – BEC – www.unive.it/bec
  - the Scientific Library – BAS - www.unive.it/bas
  - the Language Library BALI – www.unive.it/bali
  - the Humanities library BAUM, www.unive.it/baum and a new Library of Teaching Services in Venice (Zattere) – www.unive.it/bsd with around 75,000 volumes and covering 2,200 m² and 310 desks.

Departmental libraries are also available as well as an interlibrary loan service, with both national and foreign libraries.

www.biblio.unive.it
Site for Workshops and Conferences

Ca’ Dolfin, “Aula Magna” of Ca’ Foscari
Over the last few years Ca’ Foscari University has reorganized its research policy and management. In addition to the 19 departments, the traditional place of research with around 600 researchers, it has also created several interdisciplinary centers of high academic quality and international renown, carrying out research in innovative fields. These include CORILA (studies on the lagoon system), IDEAS (sustainable development), CIVEN (nanotechnologies), ECLT (complex systems and living technologies), INCA (green chemistry), CISET (tourism), CVR (services for the territory). Ca’ Foscari is also on the founder of Nesting, a very recent consortium for R&D and technological transfer of ICT.

In order to increase its own ability to raise funds and manage new projects, in particular funds from the European Commission, the University founded a Research Service which is active in the Research Division, and carries out fund raising activities which have increased Ca’ Foscari’s annual resources for research by around 4 million euros in just a few years.
University Departments

American, Hispanic and Slavonic Studies
Ancient and Near Eastern Studies
Applied Mathematics
Chemistry
**Computer Science**
East Asian Studies
Economic Sciences
Economics and Business Management
Environmental Sciences
Eurasian Studies
European and Post-Colonial Studies
Historical Studies
History of Art and Conservation of Artistic Heritage
Italian Studies and Romance Philology
Legal Sciences
Linguistics
Philosophy and Theory of Science
Physical Chemistry
Statistics
Ca’ Foscari today

**Established**
1868

**Courses**
More than 100 basic degree courses (BA), specialist degrees (MA), masters and further qualifications, research doctorates (PhD) and a regional school of specialisation for secondary school teachers

**Community**
Almost 18,000 students
1,200 teachers, including permanent and temporary staff

**Library collection**
4 libraries according to disciplinary fields, 1 with teaching services
12 department libraries
More than 830,000 volumes
Over 4,000 subscriptions to periodicals

**Motto**
Venetiarum universitas in domo Foscari

**Faculties**
4 principal academic units

**Ca’ Foscari University Rector**
Prof. Carlo Carraro

**Annual Tuition fee**
Max 1,500,00 €

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"If you travel down the Grand Canal from the Rialto to San Marco you immediately see from afar the magnificent palace of Ca’ Foscari. Set on the corner of the San Pantaléone Canal, at the bend in what Byron called the most beautiful street in the world, the Foscari Palace, the centrepiece in a long row of patrician dwellings, is as surprising for the majesty of its position as for its elegant architecture” [Federico Stefani, director of the Venice State Archives].
Computer Science

We are in Mestre, on the main land, not in the lagoon  ;-( 
Faculty

Simonetta Balsamo
Agostino Cortesi
Riccardo Focardi
Renzo Orsini
Alessandra Raffaetà
Antonino Salibra
Andrea Torsello

Michele Bugliesi
Augusto Celentano
Flaminia Luccio
Marcello Pelillo
Alessandro Roncato
Flavio Sartoretto

Giorgio Busetto
Nicoletta Cocco
Salvatore Orlando
Fabio Pittarello
Sabina Rossi
Marta Simeoni

PhD Students and Post Docs

Andrea Albarelli
Bhattacharya Sukriti
Alberto Calzavara
Alberto Carraro
Matteo Centenaro
Matteo Zanioli
Andra Marin

Damiano Macedonio
Raju Halder
Samuel Rota Bulò
Gabriele Tolomei
Maurizio Marek
Antonio Candiello
Lucia Gallina
Main Research Areas

- Databases
- Multimedia Information Systems
- Knowledge Discovery and Data Mining
- Parallel Computing
- Human Computer Interaction
- Computer Vision
- Program Analysis and Verification
- Security
- Distributed Systems
- Performance evaluation
- Numerical Computations
Education
Computer Science

• Bachelor:
  – “Laurea in Informatica” (3 years, 180 ETCS)
• Master
  – “Laurea Magistrale in Informatica” (2 years, 120 ETCS)
• PhD
  – “Dottorato in Informatica” (3 years)
# Bachelor degree

<table>
<thead>
<tr>
<th>Suggested Curricula</th>
<th>Curr. A (credits)</th>
<th>Curr. B (credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programming</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Discrete mathematics</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Computer architecture</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Calculus</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>English</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>II year</strong></td>
<td></td>
<td></td>
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<tr>
<td>Data structures and algorithms</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Operating systems</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Database systems</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>OO Programming and UML</td>
<td>6</td>
<td></td>
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<tr>
<td>Project management</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Probability and statistics</td>
<td></td>
<td>6</td>
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</tbody>
</table>
## Bachelor degree

<table>
<thead>
<tr>
<th>III year</th>
<th>Curr. A (credits)</th>
<th>Curr. B (credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer networks</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Formal languages and Computability</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Operations Research</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Law for Computer science</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Human-computer interaction</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>SW Engineering</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Web technologies and applications</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Stage</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Final Dissertation/Exam</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Elective courses</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Elective Courses

| Business administration                       | 6                 |
| System Administration Lab                    | 6                 |
| Languages for network: XML                   | 6                 |
| Web design                                   | 6                 |
| E-commerce                                   | 6                 |
| Information economy                          | 6                 |
| Physics                                      | 6                 |
## Master degree

<table>
<thead>
<tr>
<th>Stage</th>
<th>Curr. A (credits)</th>
<th>Curr. B (credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematical Logic</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Information theory</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Compilers</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Advanced database systems</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Distributed systems</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Artificial Intelligence</td>
<td>12</td>
<td></td>
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<tr>
<td>Foundations of programming languages</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>II year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numerical Algorithms</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Multimedia systems</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Data and web mining</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>High performance computing</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Computer System Performance and Reliability</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Program Analysis</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Stage</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Final Dissertation</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Free Credits</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioinformatics</td>
<td>6</td>
</tr>
<tr>
<td>Logic programming</td>
<td>6</td>
</tr>
<tr>
<td>Functional programming</td>
<td>6</td>
</tr>
<tr>
<td>Computer vision</td>
<td>6</td>
</tr>
<tr>
<td>Scientific computing and visualization</td>
<td>6</td>
</tr>
<tr>
<td>Coding theory</td>
<td>6</td>
</tr>
</tbody>
</table>
PhD Degree

- The admission is by **competitive examination**, which is announced each year by the University Ca' Foscari of Venezia generally in June/July and takes place in October/November.
- In the first year the graduate students are required to attend 6 courses and to pass the corresponding exams. Each **course consists of 20 lecture hours**. The courses are in **Italian** or in **English**.
- At the end of the three years, graduate students have to complete a **research thesis**, which must contain significant original results, published in Int.l Journals or Conferences.
- The language of the thesis must be **English**
- This research thesis is first reviewed by two **international experts**, while the actual defense will occur in front of a board of examiners composed of Italian and/or foreign experts.
Research Areas in Physics of Materials
1. Nanostructured (silicate) glasses

Giancarlo Battaglin
Elti Cattaruzza
Francesco Gonella
Enrico Trave

Main properties

* optical confinement
* optical nonlinearity
* magnetic

Applications

* photonics and integrated optics
* optoelectronics
* magnetic recording
* catalysis
* sensoristics
Research lines

**Glassy composite films**
- waveguides (linear optics)
- nonlinear optical materials
- active optical materials
- magnetic materials

* (conventional) ion exchange
Research lines

**Glassy composite films**

- waveguides (linear optics)
- nonlinear optical materials
- active optical materials
- magnetic materials

* (conventional) ion exchange
* field-assisted solid-state ion exchange
Research lines

Glassy composite films

* waveguides (linear optics)
* nonlinear optical materials
* active optical materials
* magnetic materials

* (conventional) ion exchange
* field-assisted solid-state ion exchange
* deposition by a “radiofrequency magnetron sputtering”
Research lines

Glassy composite films

* waveguides (linear optics)
* nonlinear optical materials
* active optical materials
* magnetic materials

* (conventional) ion exchange
* field-assisted solid-state ion exchange
* deposition by a “radiofrequency magnetron sputtering”

Optical properties study

* nonlinear refractive index \( n = n_0 + n_2 I \)
  * by means of a single-beam technique called “Z-scan”
2. Soft Matter theoretical group

Achille Giacometti  
Faculty

Domenico Gazzillo  
Faculty

Artem Badasyan  
Post-doc

Self-assembly processes  
Protein folding
Self-Assembly of patchy colloids

Experimental motivations

Numerical simulations and theoretical analysis

Head-to-Head

Head-to-Tail

Protein folding

Formation of secondary structure in proteins?
Helix formation?


Optimal packing induced by the solvent-chain interactions
3. High aspect ratio nanomaterials for sensors

Paolo UGO, L.M. Moretto
Laboratory of Sensors for Electroanalysis (LSE)
Template synthesis in nanoporous membranes

SEM image of template membrane

Structure generated in the template
Different nanomaterials with different shapes

- Metal mushrooms
- Nanocones
- Metal nanotubes
4. Preparation of micro and nano-sensors and micro and nano-electrodes for electroanalysis

S. Daniele
A. Baldo
C. Bragato

Carbon fiber 7 μm coating 8 μm

Pt wire 12.5 μm radius coating 8 μm
Modified electrodes with a mesoporous film of Pt

**Preparation**

Nonionic surfactant: octaethyleneglycol monohexadecyl ether (C$_{16}$EO$_8$) 42%  
- H$_2$O 29%  
- Hexachloroplatinic acid (HCPA) 29%

Modified micro and nano electrodes  

Cylindrical Pore  
($\phi = 2$-$3$ nm)
Voltametric study of the photocatalytic properties of Pt/TiO$_2$ nanocomposites

Scheme of the photoinduced processes at the Pt/TiO$_2$ and TiO$_2$/solution interface

Dependence of the photogenerated current as a function of applied potential and TiO$_2$ layer thickness: (●) 100 nm; (♦) 50 nm; (×) 20 nm, on 100-nm Pt films.
Scanning electrochemical Microscopy

- SEC M
- Pt Microelectrode
- Micropositioning device
- Redox mediator
- Unbiased Substrate
Fast SECM screening of the anodic materials activity for the electro-oxidation of \( \text{H}_2\text{O} \) to \( \text{O}_2 \)

\[ \text{O}_2 + 4e^- + 4\text{H}^+ \rightarrow \text{H}_2\text{O} \]

\[ \text{H}_2\text{O} \rightarrow \text{O}_2 + 4e^- + 4\text{H}^+ \]

Application: Fuel Cells
5. Luminescence nanocomposites containing lanthanide ions

A. Benedetti
P. Canton
D. Cristofori
I. Freris
S. Polizzi
P. Riello

Lanthanide ions: Er$^{3+}$, Yb$^{3+}$, Eu$^{3+}$, Tb$^{3+}$

Matrix: SiO$_2$, ZrO$_2$, PMMA
2 Bragg-Brentano diffractometers and 2 Kratky Cameras

A XRD camera at Elettra for “in situ” measurements at different temperatures and controlled atmosphere

TEM
Jeol 3010

SEM
Jeol 5600LV
Silica-supported Eu³⁺-doped zirconium carbonate Eu³⁺:ZrO₂ nanocrystals embedded in amorphous SiO₂
Synthesis of silica

Stober

Mesoporous silica

microemulsion
Synthesis of zirconia particles

In the presence of sodium chloride

In the presence of cesium chloride

Encapsulation of silica particles by a thin shell of PMMA