Graduate School in Information Engineering: Ph.D. program
Department of Information Engineering
University of Padova

Course Catalogue
2006
Requirements for Ph.D. Students in the Graduate School of Information Engineering:

1. Students are expected to take for credit, during the first two years of the Ph.D. program, courses for a minimum 120 hours. Course hours outside the present catalogue will be appropriately weighted. In particular, each course hour of the “Laurea specialistica” program will be normally rated as 1/2 hour.

2. Students are expected to take for credit the basic courses “Applied Functional Analysis”, “Applied Linear Algebra”. Moreover, the course “Statistical Methods” is strongly recommended to all the students.

Students are expected to enroll in the courses they intend to take at least one month before the first course lesson. To enroll it is sufficient to send an e-mail message to the secretariat of the school at the address calore@dei.unipd.it
Contents

1 Applied Functional Analysis, Prof. P. Ciatti 5

2 Applied Linear Algebra, Prof. T. Damm 7

3 Data Structures, Analysis of Algorithms and Data Compression, Prof. R. Giancarlo 9

4 Dose, Effect, Threshold, Prof. A. Tevisan 11

5 Digital Processing of Measurement Information, Prof. C. Narduzzi 12

6 Effects of Ionizing Radiation on Electronic Components: From Space Applications to Sea Level Effects, Prof. A. Paccagnella 13

7 Electrostatic Discharge in Integrated Circuits, Prof. G. Meneghesso 14

8 Innovative Device Concepts in Electronics, Prof. A. Cester 15

9 Introduction to Computer Graphics, Prof. A. Fusiello 17

10 Isotopic Tracers in Kinetic Studies, Prof. G. Toffolo 18

11 Numerical Models for Fields Analysis in Biological Beings, Prof. F. Dughiero 19

12 Power Supplies for Microprocessors: the Voltage-Regulation Module (VRM) Approach and Integration of Digital and Mixed-Signal Controllers, Prof. P. Mattavelli 20

13 Renewal and Semi-Markov Random Processes and their Application to Network Protocol Analysis, Prof. M. Zorzi 22

14 Selected Topics in Analog Integrated Circuit Design, Prof. A. Neviani 23
15 Selected Topics in Optimization, Prof. M. Pavon  

16 Statistical Methods, Prof. L. Finesso  

1 Applied Functional Analysis

Instructor: Prof. Paolo Ciatti, Dept. Metodi e modelli matematici per le scienze applicate, University of Padova, e-mail: ciatti@dmsa.unipd.it

Aim: The course is intended to give a survey of the basic aspects of functional analysis and operator theory in Hilbert spaces. First elements of Fourier analysis are also discussed.

Topics:


References:


Course requirements:

1. The classical theory of functions of real variable: limits and continuity, differentiation and Riemann integration, infinite series, uniform convergence, and the notion of a metric space. Moreover, one needs to know a bit of Lebesgue integration theory - actually, not much more than the definitions and the statements of the two main convergence results: the monotone convergence theorem and the Lebesgue dominated convergence theorem.

2. The arithmetic of complex numbers and the basic properties of the complex exponential function.

3. Some elementary set theory.


All the necessary material can be found in W. Rudin’s book *Principles of Mathematical Analysis* (3rd ed., McGraw-Hill, 1976). A summary of the relevant facts will be given in the first lecture.

Examination and grading: HW and final written examination.
2 Applied Linear Algebra

Course co-sponsored by the Graduate School in Mathematics

Instructor: Tobias Damm, TU Braunschweig, Germany, e-mail: t.damm@tu-bs.de

Aim: Concepts and techniques of linear algebra will be studied, which are important for applications and computational issues. A wide range of exercises and problems will be presented such that a practical knowledge of tools and methods of linear algebra can be acquired.

Topics:

• Singular values and generalized inverse:
  Polar form, singular value decomposition, generalized inverse, least squares problem, norms, low-rank approximation.

• Krylov subspaces:
  cyclic subspaces and Jordanblocks, matrix polynomials, projections, numerical methods.

• Matrix equations and inequalities:
  Lyapunov and Riccati equations, stability and inertia, matrix functions.

• Positive matrices and positive operators:
  Perron Frobenius theory and generalization, stochastic matrices, M-matrices and positive evolutions.

References:


Course requirements: A good working knowledge of basic notions of linear algebra, as e.g. presented in [4].
**Time table:** 16 hours. Lectures (2 hours) on Tuesday and Thursday, 10:30-12:30 A.M. First lecture on Tuesday, February 21, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

**Examination and grading:** Grading will be based on homeworks or a written examination or both.


3 Data Structures, Analysis of Algorithms and Data Compression

Instructor: Prof. Raffaele Giancarlo, Dipartimento di Matematica ed Applicazioni, Università di Palermo, e-mail: raffaele@math.unipa.it

Aim: Nowadays it is cheaper to keep information in compressed form, yet we would like fast access to it. Half a century ago, only fast access was required. That lead to the birth of many Data Structures and Algorithms for storage and retrieval. Starting from the foundations laid by Sleator and Tarjan, we will present issues in Algorithm and Data Structures design, now classics, to conclude with an apparently unrelated topic of Compression Boosting. De facto, the course will follow a very subtle thread highlighting the duality of several notions that have been used and investigated both in Data Structures and Compression. The subtle thread will naturally lead to some recent major ground breaking advances: compression boosting techniques and its data structural counterpart of compressed full text Indexes.

Topics:


2. ADVANCED DATA STRUCTURES: Data Structures for List update and Paging, i.e., Move to Front, self- adjusting trees, linking and cutting of trees. Relation to compression: MTF and splay compression.


4. ADVANCED TOPICS: Compression Boosters, Table Compressors, Wavelet Trees, Compressed Full Text Indexes.

References: The main references are listed below. Additional material will be distributed during class.


**Time table:** Course of 16 hours. Lectures (2 hours) on Tuesday 2:30–4:30 P.M. and Thursday, 10:30–12:30 A.M. First lecture on Tuesday, Oct. 3, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradinigo Building).

**Course requirements:** Any elementary course in Probability and Statistics, Algorithms and Data Structures, Programming. It is desirable to have basic notions of Coding and Information Theory.

**Examination and grading:** Take Home Written Exam.
4 Dose, effect, threshold

**Instructor:** Prof. Andrea Trevisan, Dipartimento di Medicina Ambientale e Sanità Pubblica, Univ. di Padova, e-mail: andrea.trevisan@unipd.it

**Aim:** understanding of biological mechanisms that are the basis of the effect of chemical, physical and biological agents in humans. To supply a critical evaluation of the reference data on biological effects of electromagnetic fields.

**Topics:** General introduction to cell biology and mechanisms of pharmacokinetics. The dose and the significance of threshold. The effect (response) of the dose. Methods to define the threshold. The significance of cancer and the threshold problem. Electromagnetic fields and general aspects related to the dose and the effect.

**References:** Handouts provided by the instructor.


**Course requirements:** None.

**Examination and grading:** Oral exam.
5 Digital Processing of Measurement Information

Instructor: Prof. Claudio Narduzzi, Dept. Ingegneria dell’Informazione (DEI), University of Padova, e-mail: narduzzi@dei.unipd.it

Aim: Whenever research involves experimental activities, there is a need to characterise measuring equipment, assess the accuracy of data and, most often, process raw data to extract relevant information. The course introduces essential measurement algorithms, together with the conceptual tools that allow their characterisation in a probabilistic framework. This should provide the student with the basic skills required to formulate a measurement problem and correctly approach the analysis of uncertainty. More precisely, the course will provide basic tools and methods for processing information obtained from experimental data and assessing its accuracy.

Topics:

1. Evaluation of measurement uncertainty: the probability-based approach and the guidelines of the ISO “Guide to the evaluation of uncertainty in measurement”.

2. Quantisation and the additive noise stochastic model.

3. Characterisation of waveform digitisers.


5. Resolution in model-based measurements.

6. Compensation of measurement system dynamics: inverse problems and ill-posedness.

References: Lecture notes and selected reference material will be handed out during the course.

Time table: Course of 18 hours (two two-hours lectures per week): Classes on Tuesday and Thursday, 2:30 – 4:30 P.M., first lecture on May 2nd, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Examination and grading: Final project assignment.
6 Effects of Ionizing Radiation on Electronic Components: From Space Applications to Sea Level Effects

Instructor: Prof. Alessandro Paccagnella, Dipartimento di Ingegneria dell'Informazione (DEI), Università di Padova e-mail: paccag@dei.unipd.it

Aim: Aim of the course is to illustrate the wide interdisciplinary field of ionizing radiation effects on electronic components, involving issues proper of radiation physics, electronic devices and circuits, reliability. This course will not explore only the classical problems arising in space or high energy physics applications, but also at sea level in commercial devices.

Topics:

1. Interaction between particles and matter: energy deposition, charge recombination and collection in semiconductors and insulators. The concept of Linear Energy Transfer. Displacement damage on the lattice of crystalline and amorphous materials. Different types of radiation damage in electronic components: total dose, displacement, single ion effects. (4 hours)

2. Radiation effects: solar radiation and cosmic rays for space environments. Atmospheric neutrons for avionic applications. Ground level sources: from natural radioactive contaminants to radiogenic machines. The High Energy Physics experiments. (2 hours)

3. Total dose effects: MOS components; recovery mechanisms and the temperature role; the ELDR case on bipolar components; test methodologies and qualification procedures. (2 hours)

4. Single event effects on components and circuits: soft error; bit-flip and stuck bit in DRAM and SRAM; Soft Error Rate in digital components; non-volatile memories; catastrophic phenomena; latch-up; gate oxide breakdown. (8 hours)

5. Technologic evolution of CMOS circuits and techniques to reduce and mitigate radiation damage. (2 hours)

References: Slides from the teacher.

Time table: 20 hours. Lectures (2 hours) on Wednesday and Friday, 10:30–12:30 A.M. First lecture on Wednesday, February 15, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Basic courses of Electronics, including Electronic devices.

Examination and grading: oral examination
7  Electrostatic Discharge in Integrated Circuits

Instructor:  Prof. Gaudenzio Meneghesso, Dept. Ingegneria dell’Informazione (DEI), University of Padova, e-mail: gaudenzio.meneghesso@unipd.it

Aim:  This course is intended to provide an introduction coverage of the Electrostatic Discharge (ESD) problem in modern Integrated Circuits (ICs). There are several reason that indicate the ESD problem as one of the most critical issue in modern ICs to be faced, among others: a) with the continuous technology scaling down, in the deca-nanometer dimension, devices can not sustain voltages larger than 1 V, hence these devices are extremely sensitive to electrostatic discharge and an adequate ESD protection become quite difficult to provide; b) very high speed RF circuits needs ESD protection devices that do not affect their RF performances by altering the input/output matching, so suitable ESD protection elements must be developed; c) automotive industry is making very comfortable and secure cars by filling them with as much electronics as possible working in a very hostile ambient, a suitable ESD protection of these devices is not trivial. These are only few examples that however give an impression of how much critical will be the ESD aspect in the future ICs.

Topics:

2. Test Methods.
3. Active and passive ESD protection.
4. Device Physics of the most common ESD protection elements.
7. Circuit Simulation basics: approaches and applications.

References:

Time table: Course of 20 hours (2 two-hours lectures per week): Classes on Monday 2:30 – 4:30 P.M. and Friday, 10:30 – 12:30 A.M.. First lecture on November 13 (there will be no classes on December 4 and December 8). Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Introductory course of device physics: “Microelectronics”

Examination and grading: Design and SPICE verification of an ESD protection network.
8 Innovative Device Concepts in Electronics

Instructor: Andrea Cester, Dept. Ingegneria dell’Informazione (DEI), University of Padova, e-mail: andrea.cester@dei.unipd.it

Aim: Aim of the course is to illustrate the innovations and the new concepts which permit the CMOS technology to continue the Moore’s Law, addressing issues proper of device physics, technology, and circuits. This course cover different aspects of the Silicon On Insulator (SOI) technology, materials, fabrication and characterisation techniques. The physics of the SOI MOSFETs receive an in-depth analysis, from the conventional SOI structures to the most innovative double gate and multiple gate SOI devices.

Topics:


3. The SOI Fully Depleted (FD) MOSFET: Electrostatics and device physics, threshold voltage and subthreshold behaviour. Scaling issues and natural length of scaling. Drain current of the FD-SOI MOSFET.

4. The Double Gate (DG) SOI MOSFET. Device physics, threshold voltage, subthreshold behaviour. DG SOI MOSFET with lightly doped or intrinsic substrate. Volume Inversion.

5. Other SOI structures. Multiple gate MOSFET: Triple gate, surrounding gate, triple plus gate.

References:

[1] Slides from the teacher.


**Time table:** 20 hours. Lectures (2 hours) on Wednesday and Friday, 2:30 – 4:30 P.M.. First lecture on Wednesday, May 3, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

**Course requirements:** Basic courses of Electronics, including Microelectronics.

**Examination and grading:** oral examination
9 Introduction to Computer Graphics

Instructor: Andrea Fusiello, University of Vertona, e-mail: andrea.fusiello@univr.it

Aim: The course is an introduction to the rendering techniques upon which many interactive graphical applications are based. The emphasis will be on the physical approximations and computational tricks that make interactive visualization feasible.

Topics:

1. Rendering as solution of the radiance equation. BRDF. Ray casting. Overview of approximate solutions.

2. Illumination models. Local (Phong) and global (ray tracing, radiosity).


4. Texture mapping.

5. Increasing realism: reflection maps, light maps, shadows, transparency.

6. Visibility processing.

References:


Time table: 12 hours. Lectures on Monday (2:30–4:30 P.M.) and Thursday (4:00–6:00 P.M.). First lecture on Monday, June 19, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradhenigo Building).

Course requirements: Basic knowledge of Linear Algebra. Some familiarity with Computational Geometry might be helpful.

Examination and grading: HW assignment.
10 Isotopic Tracers in Kinetic Studies

Instructor: Prof. Gianna Toffolo, Dept. Information Engineering, University of Padova, e-mail: toffolo@dei.unipd.it

Aim: Tracers are widely used in biomedical research, to gain kinetic information on physiological systems. The course is intended to provide a description of the process involved in designing and analysing tracer kinetic studies, starting from the steps involved in choosing an isotope for a tracer through formulating simple models to analyse the kinetic data resulting from a tracer experiment.

Topics:

1. Fundamentals of tracer kinetics: the tracer-tracee system, ideal vs real tracers, radioactive and stable isotope tracers.


3. Measurement variables, i.e. specific activity, isotope ratio, molar ratio, enrichment vs kinetic variables, i.e. tracer to tracee ratio, for single and multiple tracer experiments.

4. Experiment design in tracer kinetic studies: accessible and non accessible pools, input format, steady state and non steady state conditions, tracer perturbation and how to test it.

5. Simple models that can be used to interpret tracer kinetic studies: A-V difference models, non compartmental models, Steeles equation, precursor-product model.

References:


Time table: Course of 12 hours (one two-hours lecture per week, for 6 weeks) Classes on Wednesday 10:30–12:30. First lecture on Wednesday, April 5, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Basics of mathematical analysis.

Examination and grading: Final project assignment.
11 Numerical Models for Fields Analysis in Biological Beings

Instructor: Prof. Fabrizio Dughiero, Dept. Ingegneria Elettrica, University of Padova, e-mail: fabrizio.dughiero@unipd.it

Aim: The course will deal with the main analytical and numerical methods for the evaluation of electromagnetic and thermal fields in biological beings from the macroscopic point of view.


References: Lectures notes prepared by the teacher and a list of reference books and papers will be available at the beginning of the course.

Time table: Course of 20 hours (two 2-hours lectures per week): Classes on Monday and Friday, 10:30 to 12:30, first lecture on April 3 (there will be no class on April 28 and May 1). Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Electrotechnics, Electromagnetism, Numerical Methods.

Examination and grading: Final project assignment.
12 Power Supplies for Microprocessors: the Voltage-Regulation Module (VRM) Approach and Integration of Digital and Mixed-Signal Controllers

Instructor: Prof. Paolo Mattavelli, Dept. of Technology and Management of Industrial Systems, University of Padova, e-mail: mattavelli@ieee.org

Aim: The course presents the state-of-the-art technologies of dc-dc converters for powering the actual and future generation of microprocessor. The material discussed includes: multi-phase Voltage Regulator Module, transient modeling and analysis, control and design with adaptive voltage positioning and applications to laptop computers. The course then focuses at the controller aspects, including the use of integrated digital or mixed-signal controllers. Starting from standard analog controller architectures and design principles, the basics issues on digital control in high-frequency Switched-Mode Power Supplies are discussed, including Digital-Pulse-Width Modulation Architectures, A/D converters, and implementation of controller algorithms. Quantization effects and limit-cycling issues are also discussed. Some complete design examples are used to present practical design and implementation options, CAD tools, simulation techniques, and experiments on VRM prototypes with FPGA control.

Topics:

3. Transient modeling and analysis.
4. Control and design with Adaptive voltage positioning.
5. Two-stage solutions and applications to laptop computers.
6. Integrated digital and mixed signal controller for high-frequency dc-dc converters.
7. Digital Pulse Width Modulation architectures.
8. Design examples used to present practical design and implementation options, CAD tools, simulation techniques for high-frequency dc-dc converters.
9. Rapid prototyping of digital and mixed-signal controller with FPGAs.

References:


**Time table:** Course of 12 hours (two two-hours lectures per week). Lectures (2 hours) on Monday and Wednesday, 10:30–12:30 A.M. First lecture on Monday, September 11, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

**Course requirements:** Undergraduate knowledge of electronics, control theory and industrial electronics

**Examination and grading:** Final assignment.
13 Renewal and Semi-Markov Random Processes and their Application to Network Protocol Analysis

Instructor: Prof. Michele Zorzi, DEI, e-mail: zorzi@dei.unipd.it

Aim: The course presents a quick overview of Poisson processes and their main properties. It deals in some detail with renewal processes and their applications. Finally, it presents some results on renewal reward and semi-Markov processes and their application to protocol analysis.

Topics:
1. Poisson processes, interarrival times and relevant statistics.
2. Renewal processes, definitions and main concepts.
3. The Poisson process as a renewal process.
4. Asymptotic behavior of renewal processes, main results.
5. Elementary renewal theorem.
6. Renewal equation and its solution and applications.
7. Key renewal theorem and its applications.
10. Semi-Markov processes and example of application to protocol analysis.

References:

Time table: 20 hours. Lectures (2 hours) on Monday and Friday, 10:30–12:30 A.M. First lecture on Monday, May 15, 2006 (there will be no class on May 2). Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Standard probability theory background and some general knowledge of networking and protocols.

Examination and grading: Homework and (possibly) final exam.
14 Selected Topics in Analog Integrated Circuit Design

**Instructor:** Prof. Andrea Neviani, Dept. Ingegneria dell’Informazione (DEI), University of Padova, e-mail: neviani@dei.unipd.it

**Aim:** Despite the pervasivity of digital signal processing, the most critical parts of an integrated system, in terms of power, speed, design effort, are analog front-ends and output stages, where low-noise, low-distortion amplification, conditioning and conversion of the signal takes place. This course is focused on the theory and design of switched-capacitor circuits, that represent the main technique used today to implement analog, sampled-data filters.


**References:**


**Time table:** Course of 18 hours (one two-hours lecture per week, for 9 weeks): Classes on Monday 10:00–12:00 A.M. First lecture on Monday, October 2, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

**Course requirements:** Introductory course on CMOS analog integrated circuit design.

**Examination and grading:** Final circuit-design assignment.
15 Selected Topics in Optimization

Instructor: Michele Pavon, e-mail: pavon@math.unipd.it

Aim: Basic results in Convex Optimization and in the Calculus of Variations with applications to Control Engineering.

Topics:

• Elements of Convex Optimization.
• Elements of Calculus of Variations.
• Optimal control problems.
• Maximum entropy problems. Applications to Control and Spectral Estimation.

References:


Time table: 20 hours. Lectures (2 hours) on Tuesday and Friday, 10:30–12:30 A.M. First lecture on Friday, January 13, 2006. Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

Course requirements: Basic knowledge in control and optimization.

Examination and grading: 4 HW assignments.
16 Statistical Methods

Instructor: Lorenzo Finesso, Istituto di Ingegneria Biomedica, ISIB-CNR, Padova
e-mail: lorenzo.finesso@isib.cnr.it

Aim: The course will present a survey of statistical techniques which are important in applications. The unifying power of the information theoretic point of view will be stressed.

Topics:

Background material. The noiseless source coding theorem will be quickly reviewed in order to introduce the basic notions of entropy and informational divergence (Kullback-Leibler distance) of probability measures. The analytical and geometrical properties of the divergence will be presented.

Divergence minimization problems. Three basic minimization problems will be posed and, on simple examples, it will be shown that they produce the main methods of statistical inference: hypothesis testing, maximum likelihood, maximum entropy.

Multivariate analysis methods. Study of the probabilistic and statistical aspects of the three main methods: Principal Component Analysis (PCA), Canonical Correlations (CC) and Factor Analysis (FA). In the spirit of the course these methods will be derived also via divergence minimization. Time permitting there will be a short introduction to the Nonnegative Matrix Factorization method as an alternative to PCA to deal with problems with positivity constraints.

EM methods. The Expectation-Maximization method was introduced as an algorithm for the computation of Maximum Likelihood (ML) estimator with partial observations (incomplete data). We will present the EM method as an alternating divergence minimization algorithm (`a la Csiszár Tusnády) and show its application to the ML estimation of Hidden Markov Models.

The MDL method. The Minimum Description Length method of Rissanen will be presented as a general tool for model complexity estimation.

Monte Carlo methods. The basic ideas of the Monte Carlo methods, including Markov Chain Monte Carlo, will be presented in the context of deterministic and stochastic problems.

References: A set of lecture notes and a list of references will be handed out on first day of classes.


Course requirements: Basics of Probability Theory and Linear Algebra.

Examination and grading: homework assignments and take-home exam.
17 Techniques for the Effective Transmission of Multimedia Signals

Instructor: Gian Antonio Mian, Università di Padova, e-mail: mian@dei.unipd.it, and Roberto Rinaldo, Università di Udine, e-mail: rinaldo@uniud.it

Aim: The aim of the course is to provide a comprehensive overview of recent techniques for image and video coding and for robust transmission of multimedia signals over error prone networks.

Topics:

Lossless coding: entropy; uniquely decodable codes; I Shannon theorem; the typical set; Huffman, arithmetic and Ziv-Lempel coding (2 lessons).

Lossy coding: distortion measure; differential entropy; the typical set for continuous random variables; the rate-distortion and distortion-rate functions; the gaussian case and the Shannon lower bound (2 lessons).

The image coding JPEG and JPEG2000 standards (2 lessons).

The video coding H.264/AVC standard (1 lesson).

Robust Transmission of image and video sequences. (1 lesson).

Multiple description coding: generalities and the frame based approach (1 lesson).

Distributed video coding (1 lesson).

References:

The main references are listed below. Additional material will be distributed during class.


**Time table:** 20 hours (10 lectures of 2:00 h. each). Lectures on Tuesday and Thursday, 10:30–12:30 A.M. First lecture on Tuesday, April 4, 2006 (there will be no classes in April 18 and April 25). Room DEI/G (3-rd floor, Dept. of Information Engineering, via Gradenigo Building).

**Course requirements:** Any elementary course in Probability and Statistics and Signal Processing. It is desirable to have basic notions of Coding and Information Theory.

**Examination and grading:** 5 homeworks.
<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>

**February 2006**

Ph.D. courses: Room DEI/G

January 2006

M
T
W
T
F
S
S
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

March 2006

M
T
W
T
F
S
S
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
<table>
<thead>
<tr>
<th>Date</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2006</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
</tr>
<tr>
<td>27</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
</tr>
<tr>
<td>28</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
</tr>
<tr>
<td>29</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
</tr>
<tr>
<td>30</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Mian-Rinaldo</td>
<td>10:30 Dughiero</td>
<td>10:30 Mian-Rinaldo</td>
</tr>
</tbody>
</table>

Room DEI/G
<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>10:00</td>
<td>Neviani</td>
<td>10:30</td>
<td>Ciatti</td>
<td>14:30</td>
<td>Ciatti</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10:00</td>
<td>Neviani</td>
<td>14:30</td>
<td>Meneghesso</td>
<td>10:30</td>
<td>Finesso</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>5</td>
<td>10:00</td>
<td>Neviani</td>
<td>14:30</td>
<td>Meneghesso</td>
<td>10:30</td>
<td>Finesso</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
</tr>
<tr>
<td>7</td>
<td>10:00</td>
<td>Neviani</td>
<td>14:30</td>
<td>Meneghesso</td>
<td>10:30</td>
<td>Finesso</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>9</td>
<td>10:00</td>
<td>Neviani</td>
<td>14:30</td>
<td>Meneghesso</td>
<td>10:30</td>
<td>Finesso</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>10:30</td>
<td>10:30</td>
<td>10:30</td>
</tr>
</tbody>
</table>

Ph.D. courses: Room DEI/G
<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 Neviani</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Ciatti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Finesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:30 Ciatti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Meneghesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:30 Meneghesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Finesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Ciatti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 Meneghesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:30 Meneghesso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>