

CDIO at ISEP and Portuguese Engineering Organizations



INSTITUTO SUPERIOR DE **ENGENHARIA** DO PORTO

ENSINO SUPERIOR PÚBLICO

WWW.ISEP.IPP.PT

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CDIO Meeting at UPC
23-25 June 2009



About ISEP

- 150 years old engineering school
 - Located in Porto (2nd largest city in Portugal)
 - Largest Portuguese polytechnic engineering school
 - 9 Bachelor degrees and 5 Masters (Bologna 3+2)
 - 6000 students, 450 faculty and staff
 - Research and professionally oriented teachers
 - 4 nationally accredited R&D groups
 - Integrated in Porto Polytechnic (16000 students)



CDIO at ISEP (I)

- The Bologna transition at ISEP
 - Degree reformulation work started in 2003
 - ISEP envisioned common math and physics courses, integrative courses in all semesters, increase of practical / hands-on classes, professionally oriented project capstones, outcome orientation, etc
 - National laws published in 2006 (revised in 2008)
 - CDIO adoption proposed in July 2006
 - Bologna 1st cycles transition started in 2006-07



CDIO at ISEP (II)

- 1st Cycle changes and CDIO principles/standards
 - Introductory engineering courses in all degrees
 - Workspaces / labs available in all degrees
 - Lots of problem / project based curricular work
 - Many extra curricular recognized activities available
 - Active learning is largely dominant in classes
 - Periodic project based teamwork in many degrees
 - Capstone “professional” project in all degrees
 - Student integration into R&D units of ISEP, etc



CDIO at ISEP (III)

- Ongoing support initiatives at ISEP
 - Pedagogical support group
 - Focus on pedagogical support to educational activities
 - Technological support group
 - Promote the use of complementary (technological) educational resources by faculty
 - Motivate and encourage students for alternative and more pro-active learning processes
 - IEEE Real-World Engineering Projects
 - Hands-on team-based “real” projects for 1st year students
 - Self-study workshops for improving pedagogical practice



CDIO at ISEP (III)

• Ongoing

– Project

– Team

– ISEP

IEEE REAL WORLD ENGINEERING PROJECTS

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RWEP SUBMISSIONS PROJECT & WORKSHOP LIBRARY AUTHOR PROFILES PROJECT ADOPTERS ABOUT RWEP

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Author Profile

Mrs. Betina Campos Neves

VERTICAL AXIS WIND TURBINE (VAWT) FOR MICRO-ENERGY GENERATION: SPINNING

STUDENTS MINDS

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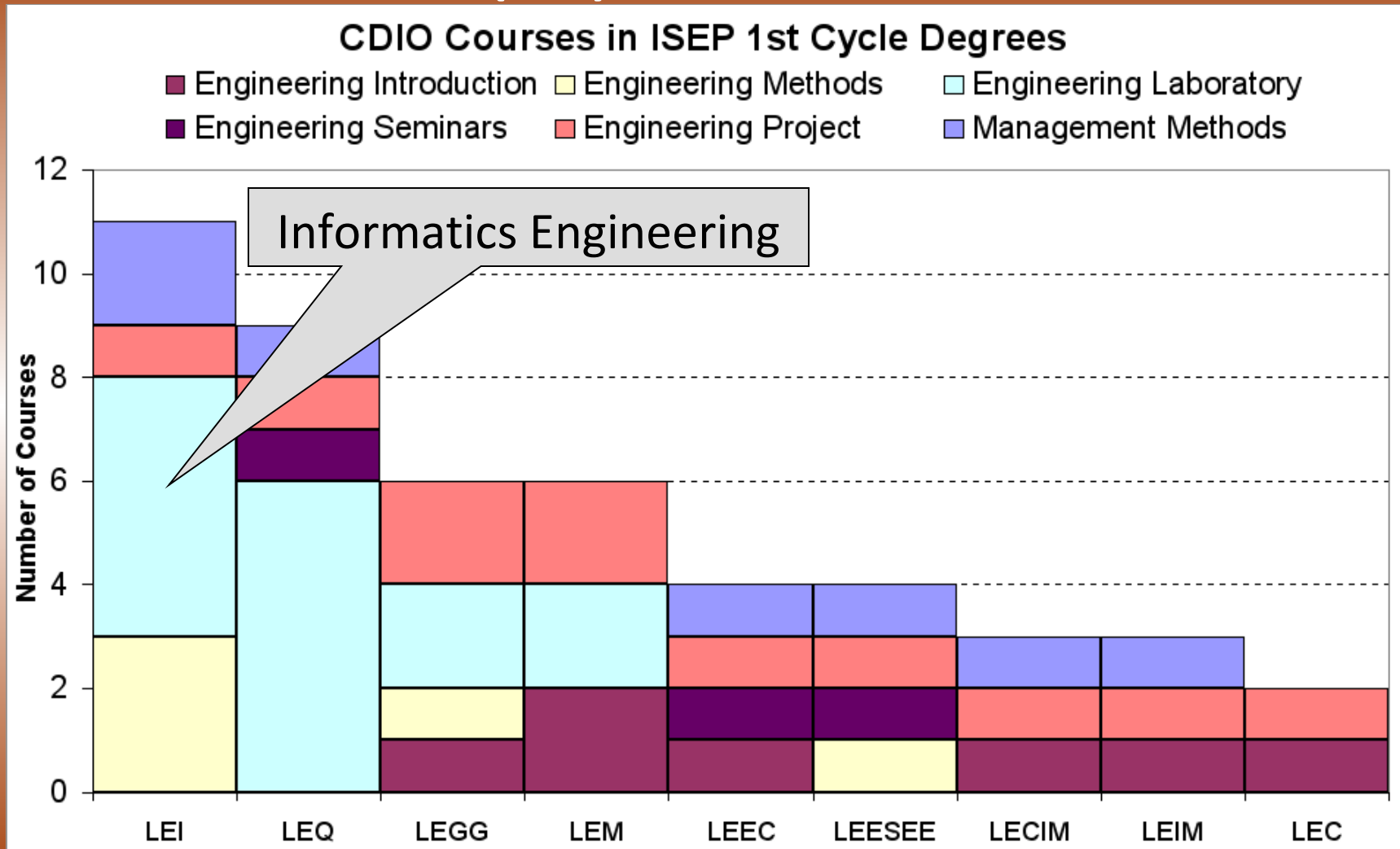
UPCOMING DEADLINES

| | |
|-----------------|---|
| 1 February 2009 | Call for Abstracts: Invitation sent |
| 30 April 2009 | Call for Abstracts: Submission deadline |
| 15 May 2009 | Invitation to submit a full project/workshop proposal sent |
| 30 June 2009 | Full Proposal: Submission deadline |
| 15 August 2009 | Invitation to submit a final project/workshop sent |

Title: MSc
Organization: ISEP Instituto Superior de Engenharia so Porto
University Website: <http://www.isep.ipp.pt/>



CDIO at ISEP (IV)





CDIO at ISEP (V)

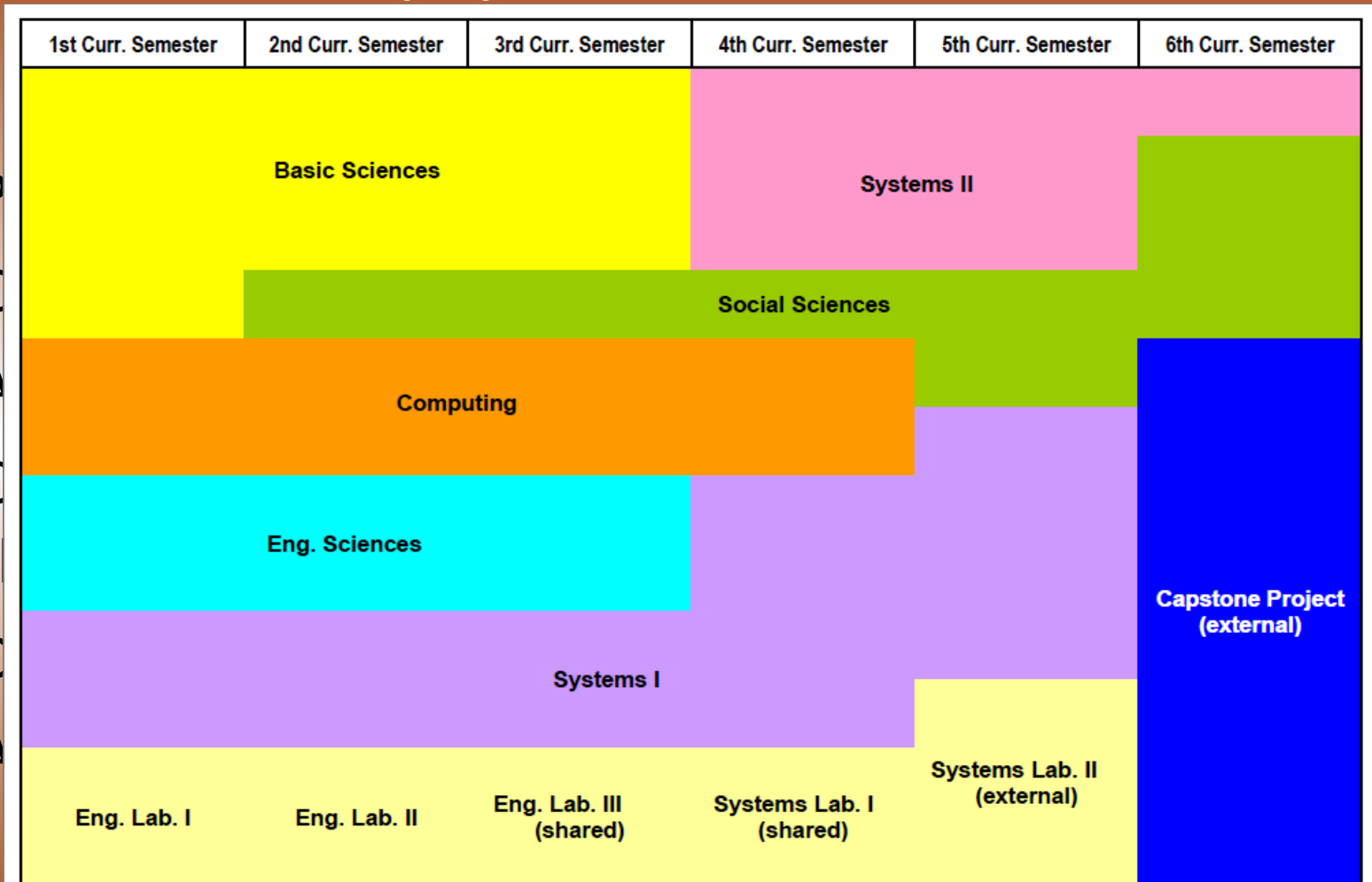
- 1st Cycle degree on “Systems Engineering”
 - Proposed by a team led by CDIO supporters
 - Conceived by ISEP & AEP (entrepreneurs association)
 - A true multidisciplinary engineering 1st cycle
 - CDIO principles and practices were used in creating the study plan, curricular content, projects, etc
 - Designed for a small number of selected students
 - Authorized by the Ministry of HE in May 2009



CDIO at ISEP (V)

- 1st

– P
– C
– A
– C
t
– D
– A



ISEP Program on Systems Engineering (1st cycle Bologna, 3 years)



CDIO at LEI-ISEP (I)

- The Bologna transition at Informatics Eng. Dep.
 - Informatics Eng. Dep. started reformulation in 2002
 - Based on ACM Computing Curricula Reports (CS'01, CE'04, IS'02, SE'04, **OR'05**) e Career Space guidelines
 - CDIO was adopted in 2005 and soon became very helpful
 - 1st Cycle Informatics Eng. (LEI) Syllabus
 - Started by a group of 5 people in June 2007
 - The first LEI draft syllabus made available in Sep. 2007
 - Department accepted LEI syllabus produced in May 2008
 - Syllabus section 1.2 inspired in ACM CC **OR'05** (rev. 2006)

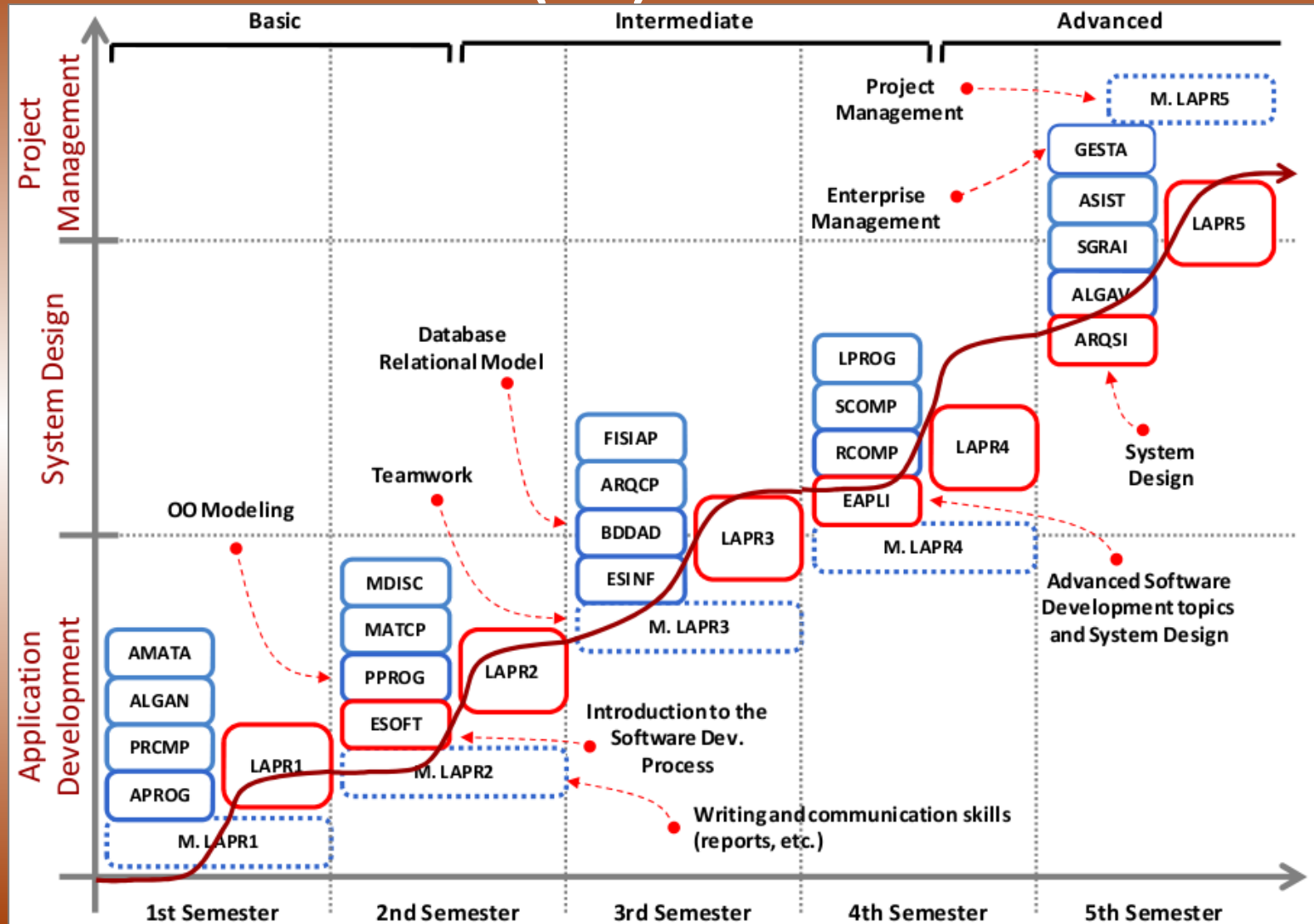


CDIO at LEI-ISEP (II)

- The 1st Cycle on Informatics Engineering (LEI)
 - The backbone is Software Development Process
 - Adopted an integrated model / process orientation
 - Based on a customisable and extensible framework
 - For iterative and incremental system development
 - Key differentiator for its graduates and faculty
 - Since 2006-07 already showing interesting results
 - Increase on number of candidates (global and 1st choice)
 - Increase on faculty involvement, training and cohesion



CDIO at LEI-ISEP (III)



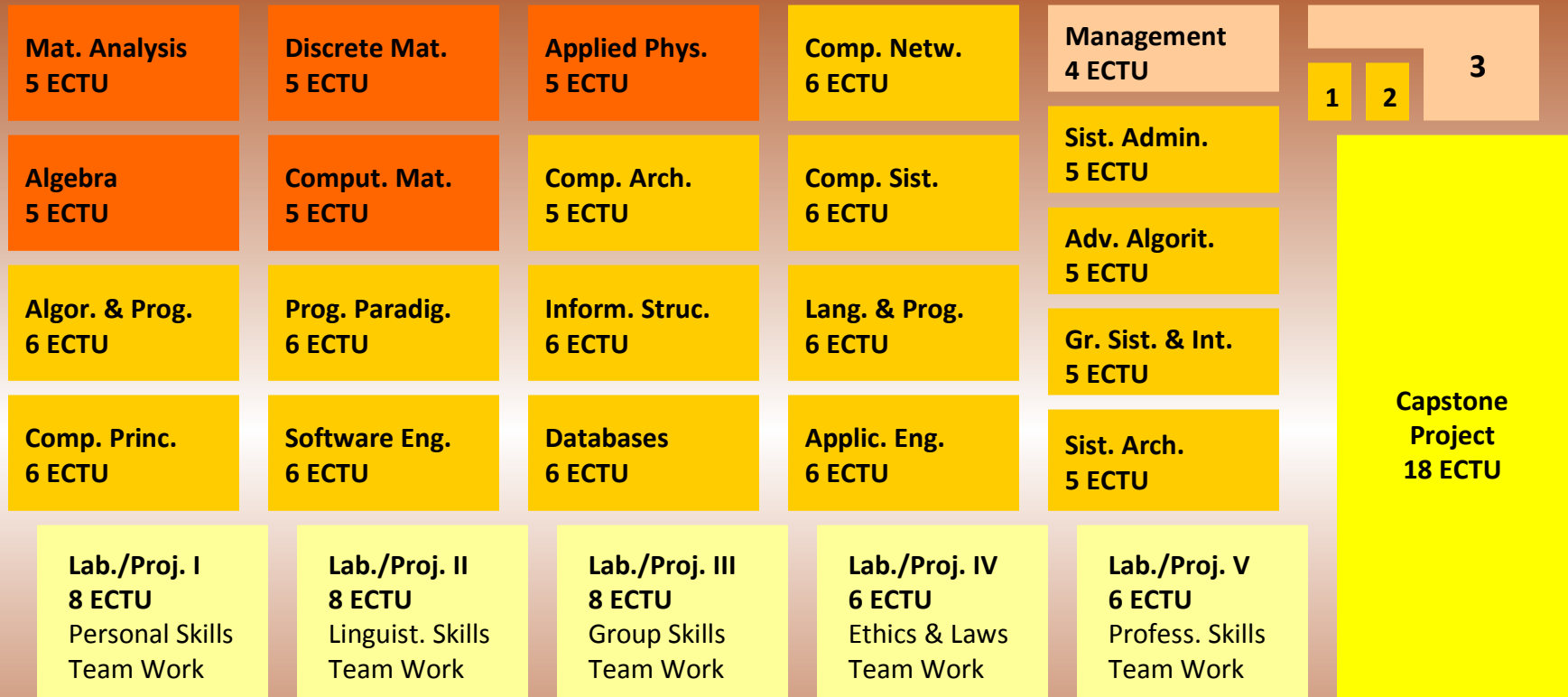


CDIO at LEI-ISEP (IV)

- The 1st Cycle on Informatics Engineering (LEI)
 - Semesters 1 to 5 [inspired by the DTU experience]
 - 12 weeks for classical courses with “continuous” evaluation and a final written exam (40-60% grading)
 - 4 weeks in a laboratorial hands-on course for developing a significant project with growing complexity and realism
 - Semester 6
 - Scientific / professionally oriented capstone project
 - Much more proposals than students (240/130 in 2008-09)
 - 85% of students choose externally proposed projects



CDIO at LEI-ISEP (V)



SCIENCES



INFORMATICS



Capstone Project



MANAGEMENT



Lab./Project

- 1 – Artificial Intel. (4 ECTU)
- 2 – Advanced Comp. (4 ECTU)
- 3 – Organiz. Behaviour (4 ECTU)



CDIO at LEI-ISEP (VI)

| LEI Syllabus Questionnaire | | Index |
|-----------------------------------|--|--------------|
| 1 | TECHNICAL KNOWLEDGE AND REASONING | 3 |
| 1.1 | KNOWLEDGE OF UNDERLYING SCIENCES | 2 |
| 1.2 | CORE ENGINEERING FUNDAMENTAL KNOWLEDGE | 3 |
| 1.3 | ADVANCED ENGINEERING FUNDAMENTAL KNOWLEDGE | 3 |
| 2 | PERSONAL AND PROFESSIONAL SKILLS AND ATTRIBUTES | 3 |
| 2.1 | ENGINEERING REASONING AND PROBLEM SOLVING | 3 |
| 2.2 | EXPERIMENTATION AND KNOWLEDGE DISCOVERY | 3 |
| 2.3 | SYSTEM THINKING | 2 |
| 2.4 | PERSONAL SKILLS AND ATTITUDES | 2 |
| 2.5 | PROFESSIONAL SKILLS AND ATTITUDES | 3 |
| 3 | INTERPERSONAL SKILLS: TEAMWORK AND COMMUNICATION | 2 |
| 3.1 | TEAMWORK | 2 |
| 3.2 | COMMUNICATIONS | 2 |
| 3.3 | COMMUNICATIONS IN FOREIGN LANGUAGES | 2 |
| 4 | CONCEIVING, DESIGNING, IMPLEMENTING AND OPERATING SYSTEMS | 2 |
| 4.1 | ENTERPRISE AND SOCIETAL CONTEXT | 2 |
| 4.2 | CONCEIVING AND ENGINEERING SYSTEMS | 2 |
| 4.3 | DESIGNING | 2 |
| 4.4 | IMPLEMENTING | 3 |
| 4.5 | OPERATING | 2 |

Proficiency index
2 – Application
3 – Analysis



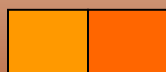
CDIO at LEI-ISEP (VII)

| CDIO Standards Implementation at LEI-ISEP | | Level (0-4) |
|---|--|----------------|
| 1 | The Context | 3 |
| 2 | Learning Outcomes | 2 |
| 3 | Integrated Curriculum | 3 |
| 4 | Introduction to Engineering | 3 |
| 5 | Design-Implement Experiences | 4 |
| 6 | Engineering Workspace | 3 |
| 7 | Integrated Learning Experiences | 3 |
| 8 | Active Learning | 2 |
| 9 | Enhancement of Faculty Skills Competence | 0 |
| 10 | Enhancement of Faculty Teaching Competence | 1 |
| 11 | Learning Assessment | 2 |
| 12 | Program Evaluation | 1 |



CDIO at LEI-ISEP (VIII)

| | | | |
|--------------------------------|--------------------------------|---|-------------------|
| Mandatory 7.5 ECTU | Mandatory 7.5 ECTU | Innovation & Entrepreneur. 4.5 ECTU | Thesis 48 ECTU |
| Mandatory 7.5 ECTU | Mandatory 7.5 ECTU | Optative 7.5 ECTU | |
| Mandatory 7.5 ECTU | Optative 7.5 ECTU | | |
| Optative 7.5 ECTU | Optative 7.5 ECTU | | |
| <i>Opened Laboratories</i> | <i>Opened Laboratories</i> | | |



INFORMATICS



Thesis (Dissertation/Project/Externship)



Open Laboratory



CDIO at other Portuguese Orgs

- Portuguese Engineers Association (OE)
 - Quality Assessment To Award the EUR-ACE Label
 - A quality evaluation system for 2nd cycle degrees (MSc)
 - EUR-ACE, ABET and CDIO as sectoral frameworks
 - CDIO Syllabus Reports (2002) and ABET Criteria (2009) mentioned as relevant documents for good evaluation
 - 4 MSc university degrees have the OE+EUR-ACE label
 - ISEP will soon apply for the OE+EUR-ACE label on all five Bach+MSc programs as a first step for the national agency mandatory accreditation



Capstone European Projects

- Areas for ISEP
 - Informatics, Electrotechnical, Mechanical, Chemical, Geotechnics, Biomedical Engineering 1st cycles
- Proposal from ISEP
 - Joint development of an advanced website for the CDIO Southern/Central Europe group

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