The Second International Timetabling Competition (ITC-2007)
Curriculum-based Course Timetabling Track
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SSC2007 Scheduling a Scheduling Competition
1 University Timetabling Problems

2 The 1\textsuperscript{st} International Competition (ITC-2002)

3 The 2\textsuperscript{nd} International Competition (ITC-2007)
   - Novelties, Tracks, & Rules
   - Detailed Description of Track 3 (“our” track)

4 Discussion
University Timetabling

“Assign teacher/student meetings to timeslots and rooms”

Main categories:

- **Course Timetabling**: weekly schedule of lectures of courses in the classrooms
- **Examination Timetabling**: schedule the final exam of university courses in the classrooms
- **Event/Seminar Timetabling**: weekly schedule of single events in a set of classrooms
Other timetabling problems (out of the scope of ITC-2007)

- High school timetabling
- **Employee timetabling**: Nurses, Call centers, ...
- **Sport timetabling**: Round robin tournaments, ...
- **Train timetabling**: Scheduling, routing, platforming, ...
- ... (many others)
A new problem formulation
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Fixed deadline: 6 months for writing the solver
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CPU time limit ($\approx 10$ min)
Basic data: Events (300–400), timeslots (45), rooms (10–11), students (200–350)
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Hard constraints:
ITC-2002: Data & Hard Constraints

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- Hard constraints:
  - Occupancy: One event per room per timeslot
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Hard constraints:
- **Occupancy**: One event per room per timeslot
- **Conflicts**: Event-event matrix (based on common students)
Basic data: Events (300–400), timeslots (45), rooms (10–11), students (200–350)

Hard constraints:

- **Occupancy**: One event per room per timeslot
- **Conflicts**: Event-event matrix (based on common students)
- **Compatibility**: Event-room matrix (based on features and room capacity)
Late event: A student has an event in the last slot of a day
Late event: A student has an event in the last slot of a day

Consecutive events: A student has more than two consecutive events
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Consecutive events: A student has more than two consecutive events
Isolated event: A student has a single event on a day
ITC-2002: Some Critics

- Formulation not realistic enough
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- Place-list based on supplied scores, CPU time per run:
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  - Mongolian Horde approach!
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Limited impact on the community
Three tracks: Exams, Events (ITC-2002 revamped), Courses
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More realistic formulations

Opened: August 1st 2007, Closes: January 25th 2008
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- Real-world data

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- Early, Late & Hidden instances
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Early, Late & Hidden instances

Initial place-list based on ranks (on both hard and soft constraints)
Three tracks: **Exams**, **Events** (ITC-2002 revamped), **Courses**

- More realistic formulations
- Real-world data
- **Early, Late & Hidden** instances
- Initial place-list based on ranks (on both hard and soft constraints)
- Software of **Finalists** run by the organizers (tested and ranked also on **Hidden** instances)
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Software of Finalists run by the organizers (tested and ranked also on Hidden instances)

No statistical tests 😞


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Simplified w.r.t. the real formulation (only to avoid details)
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Real instances from University of Udine, Italy
Hard constraints:

- **Requirements**: Fixed number of lectures of each course
- **Room Occupation**: One lecture per room
- **Conflicts**: Courses with common students or instructor
- **Availabilities**: Professors’ requests
Soft constraints (objectives):

- **Room Capacity**: Insufficient seats
- **Minimum working days**: Professors must spread lectures
- **Compactness**: Isolated lectures in the daily schedule of a student
- **Room Stability**: Lectures of a course in different rooms
2nd Competition: Track 3, Removed Features

- Soft conflicts
- Room availability
- Room too big
- Teachers preferences on rooms and periods
- Double lectures
- Lunch breaks
- Maximum daily student load
- Curriculum compactness (more complex formulation)
Why are Competitions Useful For Timetabling

Issues in Timetabling Research:

- Lack of standard formulations and formats
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Thank You!
Registration to ITC-2007 is still open:
http://www.cs.qub.ac.uk/itc2007/