DM/DMP87 (10 ECTS)
Skedulering, Skemalægning og Ruteplanlægning
Scheduling, Timetabling and Routing

Marco Chiarandini, post doc.

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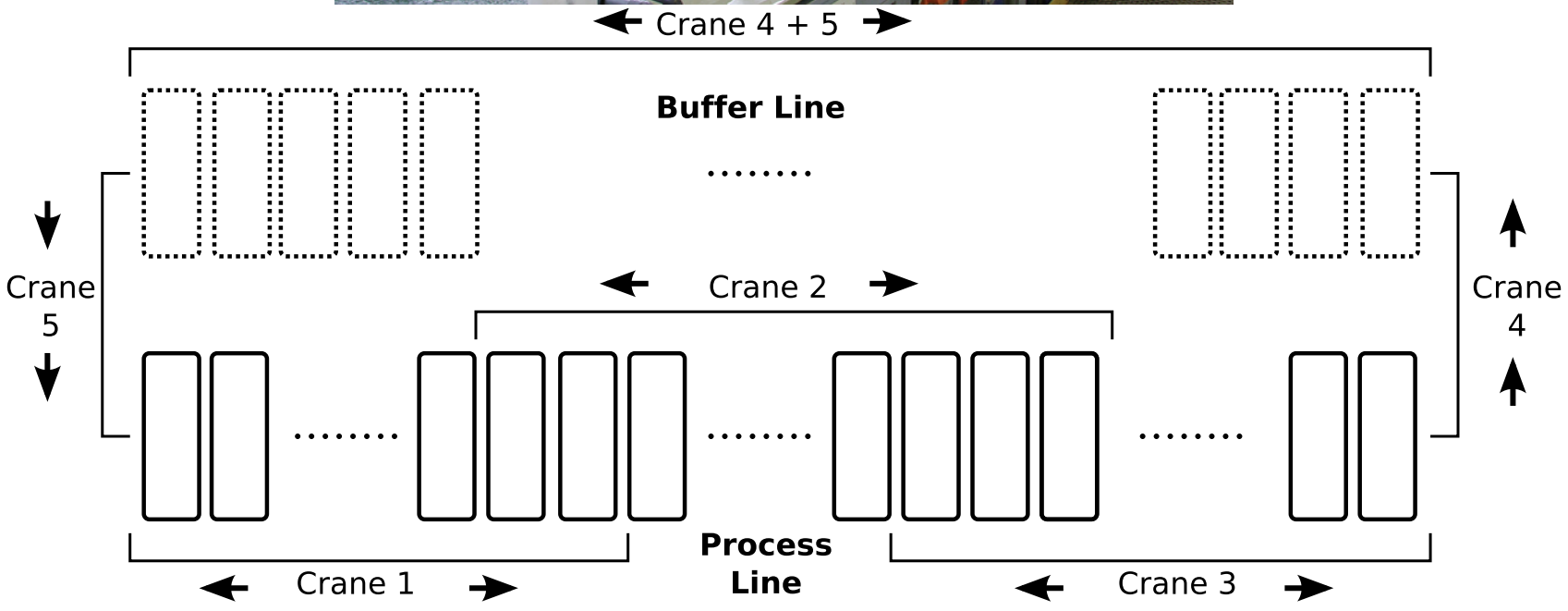
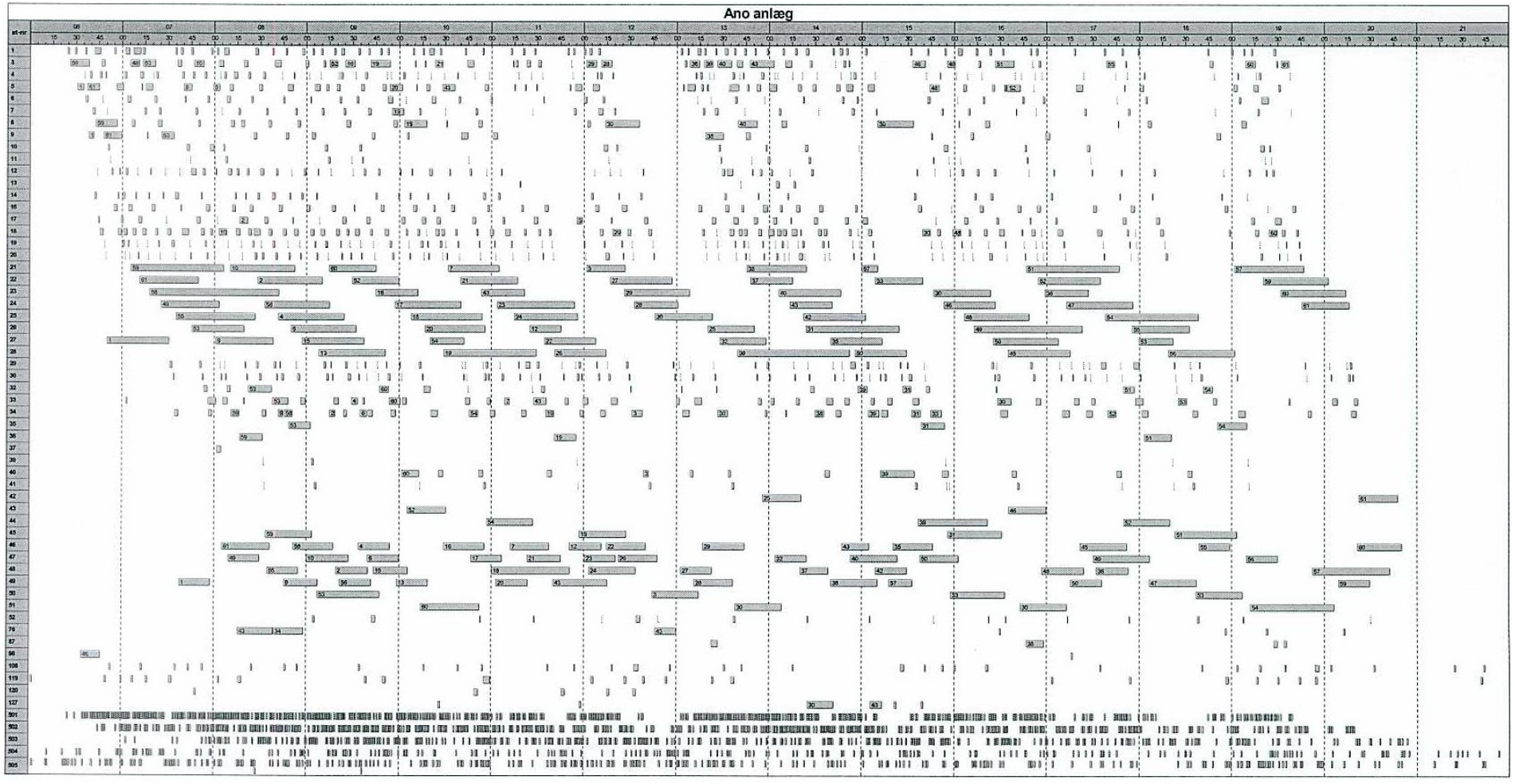
IMADA
University of Southern Denmark


Crane 4 + 5
Buffer Line
Crane 5
Crane 2
Crane 4
Process Line
Crane 1
Crane 3

Scheduling



Gantt chart

Timetabling

Eksempel på skema for førsteårene:

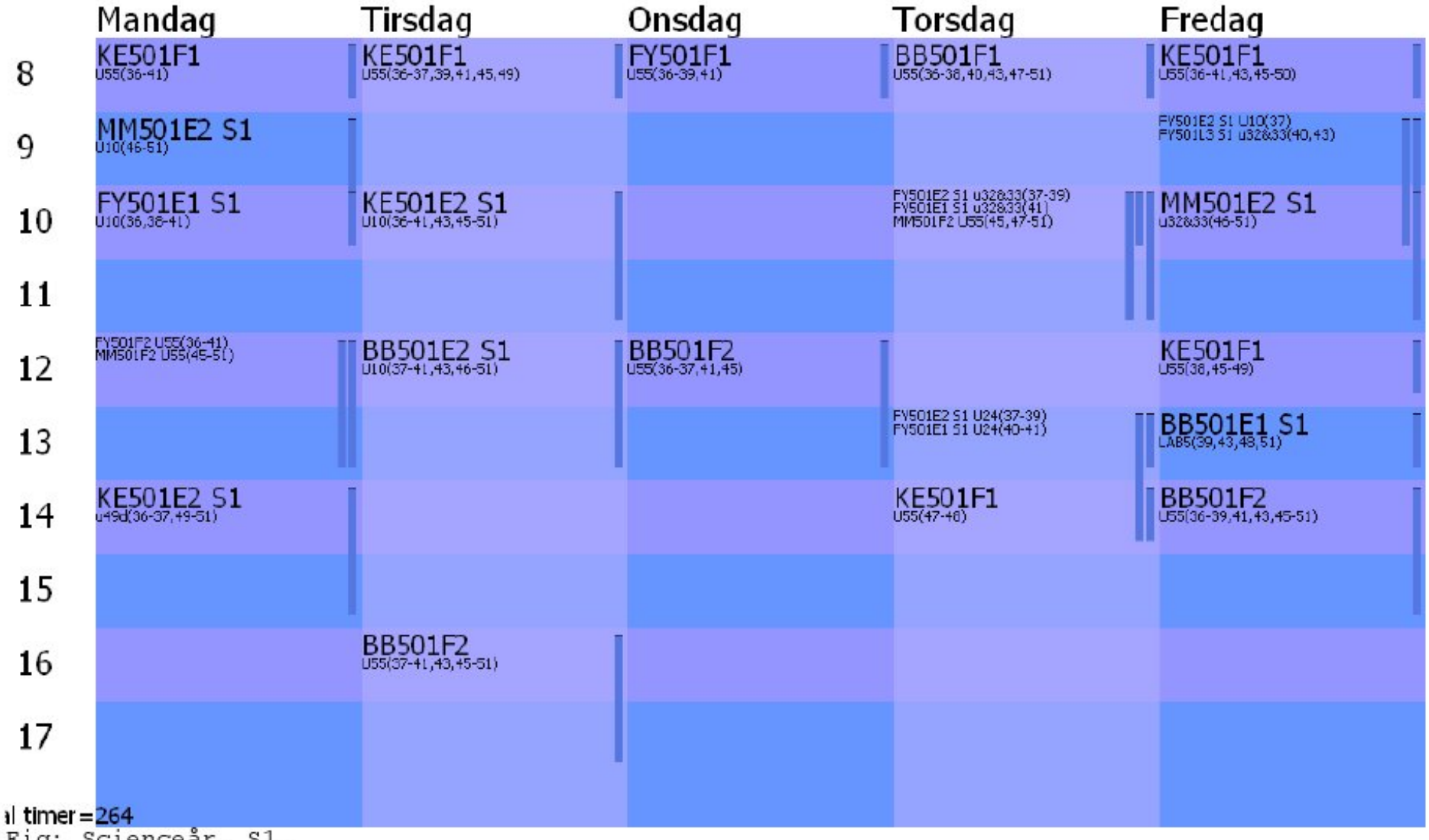


Fig: Scienceår, S1.

Timetabling

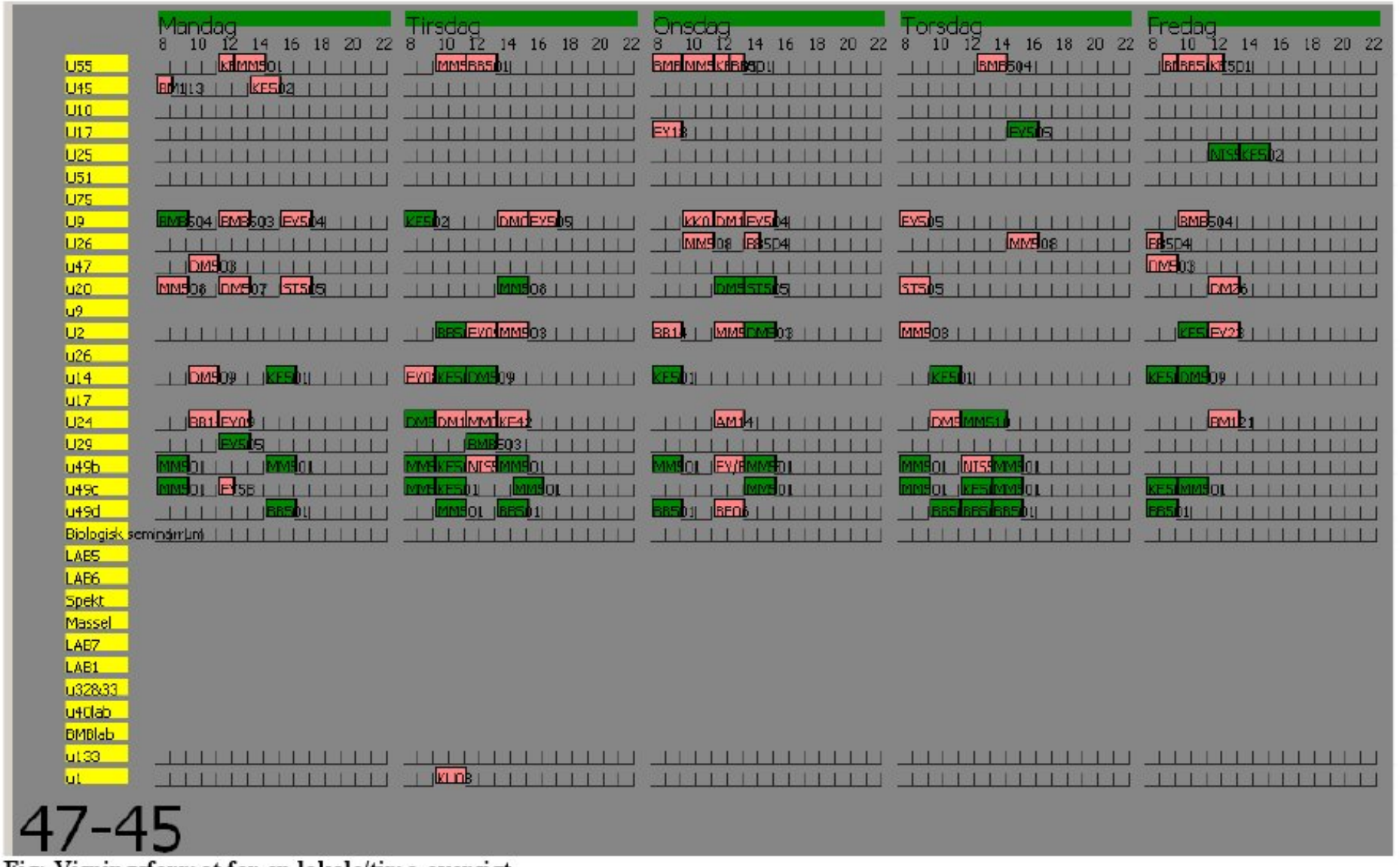
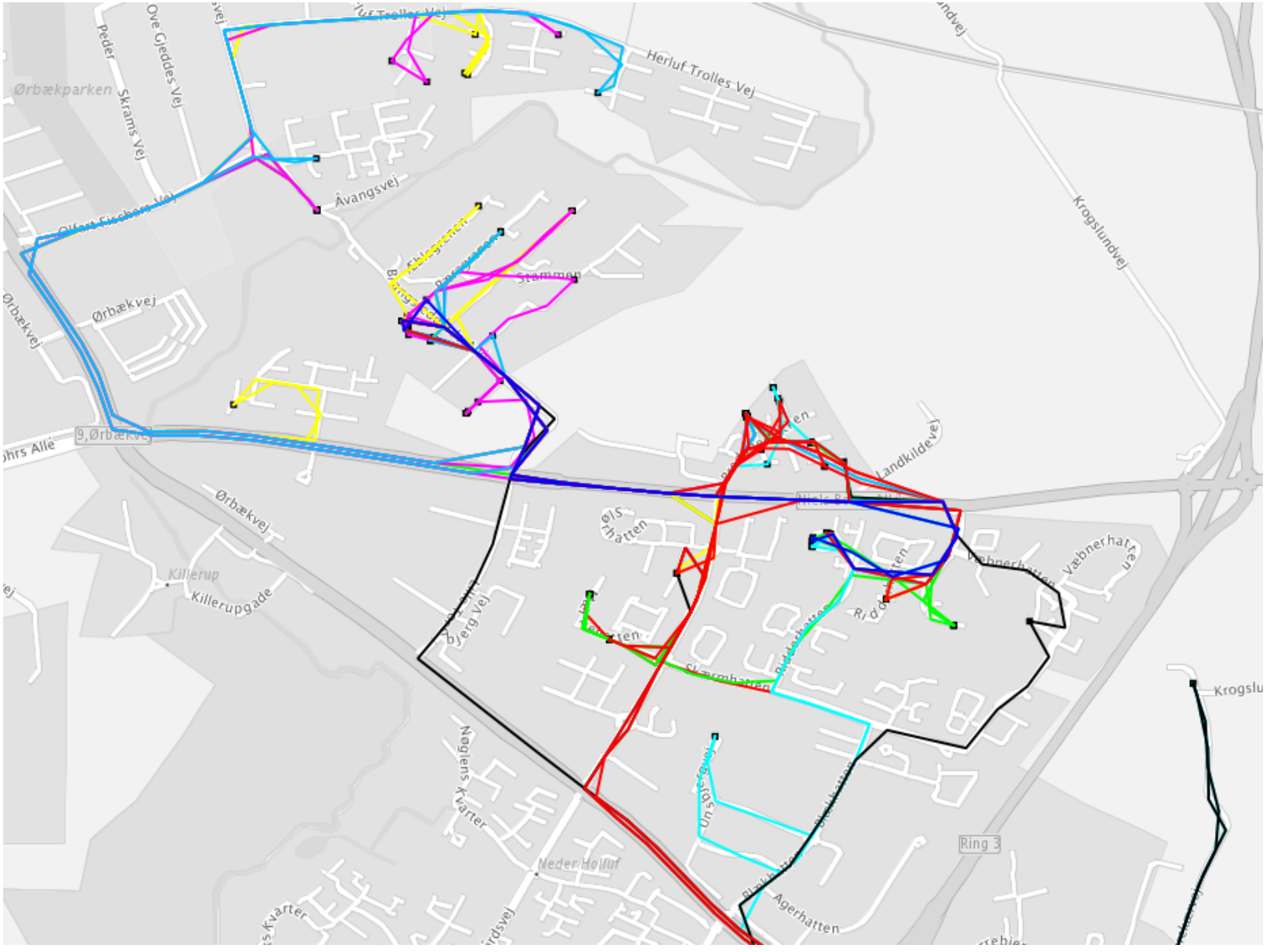


Fig: Visningsformat for en lokale/time-oversigt

Timetabling

	Mandag	Tirsdag	Onsdag	Torsdag	Fredag
8-9	DM63 (Sem)	MM/MMP36 (Sem)	DM40 (Sem)	MM10 (Sem)	DM518
9-10	DM63 (Sem)	MM/MMP36 (Sem)	DM40 (Sem)	MM10 (Sem)	DM518
10-11	MM67 (Sem)	DM518 (Sem)	MM22 (Sem)	DM63 (Sem)	MM67 (Sem)
11-12	MM67 (Sem)	DM518 (Sem)	MM22 (Sem)	DM63 (Sem)	MM67 (Sem)
12-13	DM/DMP42 (Sem)	DM40 (Sem)	DM/DMP42 (Sem)	DM/DMP49 (Sem)	MM22 (Sem)
13-14	DM/DMP42 (Sem)	DM40 (Sem)	DM/DMP42 (Sem)	DM/DMP49 (Sem)	MM22 (Sem)
14-15	DM/DMP49 (Sem)	Dat.Koll. (Sem)	MM10 (Sem)	MM/MMP36 (Sem)	Op.Alg.Koll. (Sem)
15-16	DM/DMP49 (Sem)	Dat.Koll. (Sem)	MM10 (Sem)	MM/MMP36 (Sem)	Op.Alg.Koll. (Sem)
16-17				Mat.Koll. (Sem)	
17-18				Mat.Koll. (Sem)	

Vehicle Routing

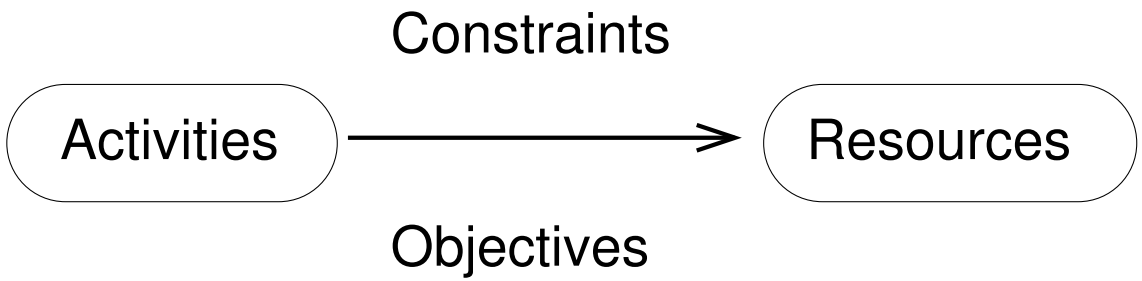


Sources

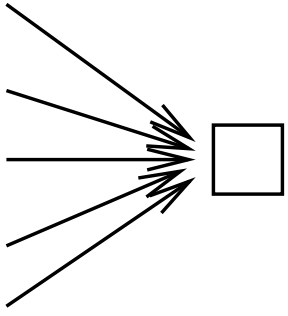
- Jakob Skov, *Scheduling of an Anodizing Plant at Bang & Olufsen*. Master Thesis, 2007.
- Anders Rasmussen. *Skemalgning for naturvidenskab ved SDU*. Master Thesis, 2007
- Steffen Elberg Godskesen. *Automated Planning of Work for Home Nurses*. Master Thesis, 2006.

Contents: Modeling

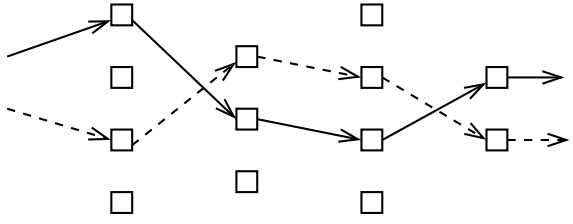
Scheduling



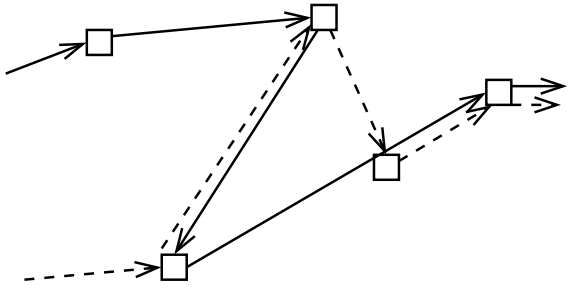
Single and Parallel Machine



Flow Shop and Flexible Flow Shop

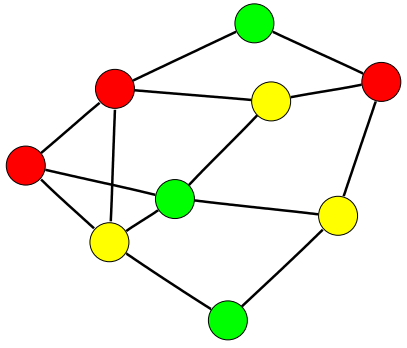


Job Shop, Open Shop



Contents: Modeling

Timetabling



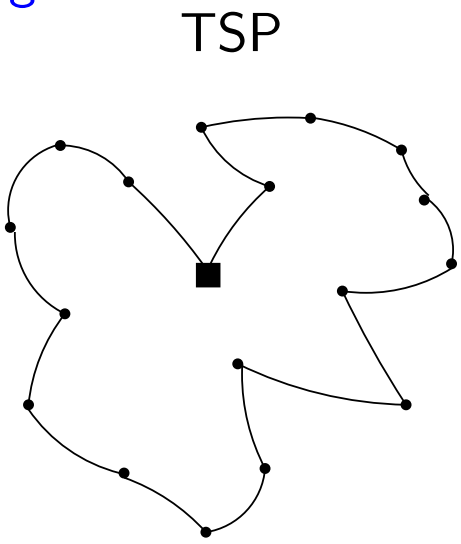
- Interval Scheduling, Reservations
- Educational and Employee Timetabling

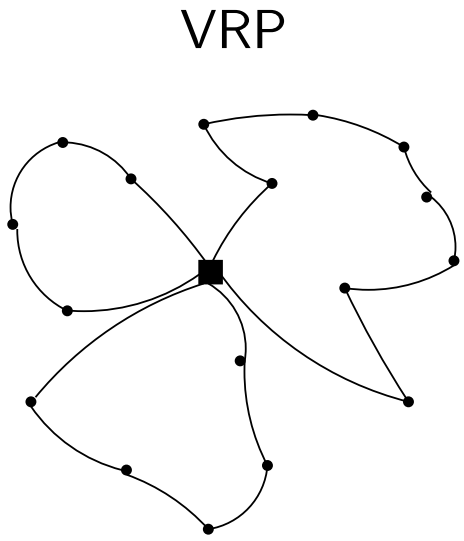
Periods

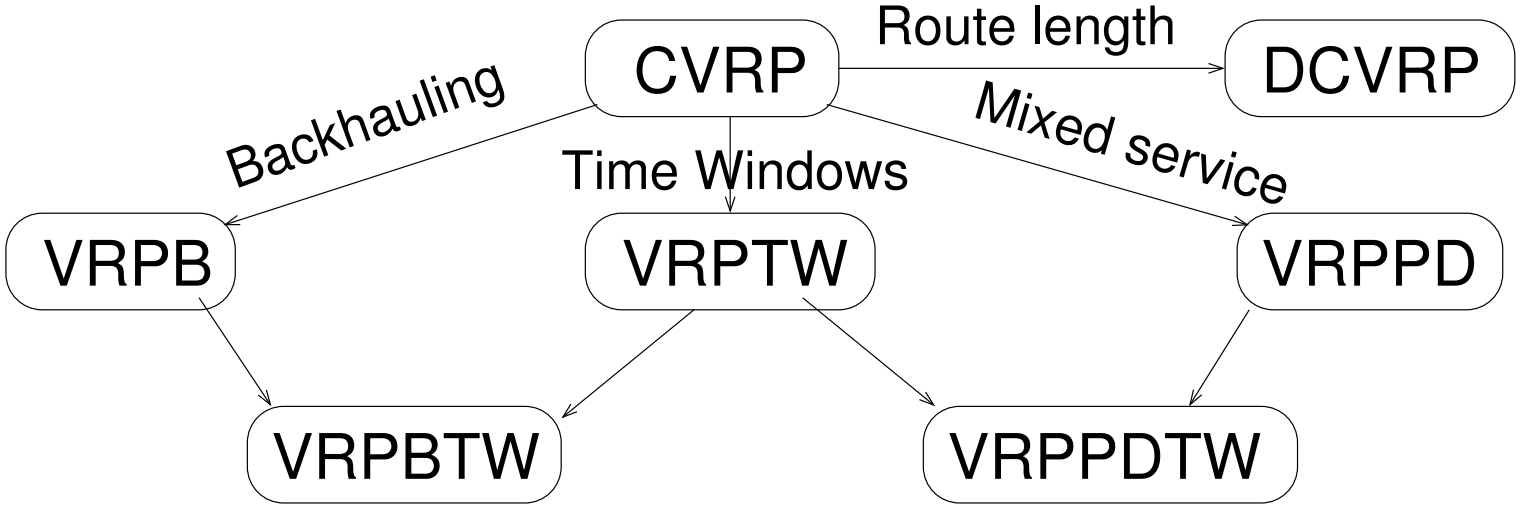
Rooms	P_1	P_2	$\cdots$	P_i	$\cdots$	P_j	$\cdots$	P_{45}
R_1	—	L_4	$\cdots$	L_{10}	$\cdots$	L_{14}	$\cdots$	—
R_2	L_1	L_5	$\cdots$	L_{11}	$\cdots$	L_{15}	$\cdots$	—
R_3	L_2	L_6	$\cdots$	L_{12}	$\cdots$	—	$\cdots$	—
$\vdots$	$\vdots$		$\vdots$		$\vdots$		$\vdots$	
R_r	L_3	L_7	$\cdots$	L_{13}		L_{16}	$\cdots$	—

- Transportation Timetabling

Vehicle Routing







Contents: Solution Techniques

- Mathematical Programming
- Networks
- Branch and Bound
- Constraint Programming
- Dedicated algorithms
- Dispatching Rules and Construction Heuristics
- Metaheuristics: SA, Tabu Search, GA

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Course prerequisites

- MM02 (linear algebra)
- DM02 (algorithms and data structures)
- The content of DM63 should be known
- DM85 (Networks and Integer Programming) would be reccomended

Students' Activity

During the Course (30 hours of lectures, 2-4 hours per week)

- Study *concepts* from text book and additional materials
  (5-6 hours per week of work load)
- *Apply* the knowledge on the case studies proposed in class
  (participatory discussions)
- Read and present an article

Final Assessment (10 ECTS)

- Oral exam of 30 minutes with external examiner (60% of final grade)
  meant to assess the base knowledge
- Group project (40% of the final grade)
  approved choice of a case study
  deliverables: program + report
  meant to assess to ability to apply

Course Material

Text book:

- M.L. Pinedo, Planning and Scheduling in Manufacturing and Services; Springer Series in Operations Research and Financial Engineering, 2005, (388 DKK)

Supplementary books:

- M.L. Pinedo, Scheduling: Theory, Algorithms, and Systems; 2nd ed., Prentice Hall, 2002.
- P. Toth, D. Vigo, eds. The Vehicle Routing Problem, SIAM Monographs on Discrete Mathematics and Applications, Philadelphia, 2002.

Further literature:

- Lecture notes
- Articles

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