

ERP (21-550)

*Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology*

Session #16



Course Description

▪ *Instructor*

- *Omid Fatahi Valilai, Ph.D. Industrial Engineering Department, Sharif University of Technology*
- *Email: FValilai@sharif.edu, Tel: 6616-5706*
- *Website: Sharif.edu/~fvalilai*

▪ *Class time*

- *Sunday-Tuesday* *16:30-18:30*
- *Wednesday* *09:00-12:00*

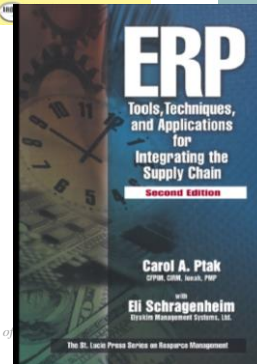
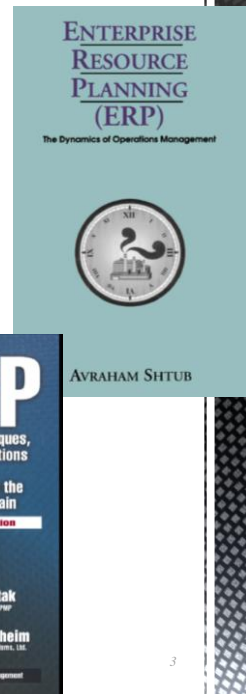
▪ *Course evaluation*

- *Mid-term* *(30%)*
- *Final exam* *(40%)*
- *Quiz* *(5%)*
- *Exercise* *(10%)*
- *ERP Lab* *(15%)*



Course Description (Continued ...)

- **Mid-term session:**
 - Sunday : 8th Azar 1394, 16:30 ~ 18:00
- **Final Exam:**
 - Sunday: 27th Dey 1394, 09:00 ~ 10:30
- **Reference:**
 - Shtub, A., "Enterprise Resource Planning (ERP)- The dynamics of operations management", 2002, Kluwer Academic Publishers
 - Ptak, Carol A., "ERP Tools, Techniques, and Applications for Integrating the Supply Chain", 2004, The CRC Press
 - Fui, F., Nah, H., "Enterprise Resource Planning", 2002, IRM Press



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Course Description (Continued ...)

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 - Sunday : 8th Azar 1394, 16:30 ~ 18:00
- **Final Exam:**
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- **Reference:**
 - Daniel E. O'leary, "Enterprise Resource Planning Systems Systems, Life Cycle, Electronic Commerce, and Risk", 2000, Cambridge University Press

Enterprise Resource Planning Systems

Systems, Life Cycle, Electronic Commerce, and Risk



Daniel E. O'Leary

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Course Description (Continued..)

- *Contents:*
 - *Enterprise Management*
 - *Operations Management*
 - *The Evolution of ERP Systems: A Historical*
 - *Organizations and organizational structures*
 - *Scheduling*
 - *Purchasing and inventory management*
 - *Marketing considerations*
 - *ERP selection and implementation*

Course Description (Continued..)

- *Contents:*
 - *Enterprise Management*
 - *History of Enterprise Resource Planning*
 - *The Theory of Constraints and ERP*
 - *Sales and Operations Planning*
 - *Buffer Resource Strategy*
 - *Enterprise Resource Management*
 - *Integrating the Supply Chain to Reap the Rewards*
 - *Strategic Sourcing and Procurement*

Course Description (Continued..)

- *Contents:*
 - *Operations Management*
 - *Operations Planning (Material and Capacity Requirements Planning)*
 - *Product Life Cycle Management*
 - *Manufacturing Execution System*
 - *Distribution*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning*
 - *CRP answers the question of how much resource is required and when is it required.*
 - *The early adopters of APS systems quickly discovered that the level of data accuracy required to develop a feasible solution required more resources than expected.*
 - *The sophisticated models can cost more to build than the value of the answer for discrete manufacturing businesses.*
 - *APS systems have found the most success in process industries where there is higher reliability of inputs due to the high levels of automation.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Units of capacity*
 - *Routings*
 - *Schedule*
 - *Shop Calendar*
 - *Capacity Management Measures*
 - *Available Capacity*
 - *Utilization Factor*
 - *Efficiency*
 - *Rated Capacity*
 - *OEE (Overall Equipment Effectiveness)*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Routings*
 - *Routings are the sequential steps that the raw materials and other parts must follow to be completed.*
 - *Other commonly used names for routings are bill of operations, instruction sheet, manufacturing data sheet, operation chart, operation list, operation sheet, route sheet, and routing sheet.*
 - *The most difficult step in developing routings is making the choice between a routing step and bill of material level*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Shop Calendar*
 - *The shop calendar defines what days the shop will work.*
 - *The shop calendar is also known as the manufacturing calendar or M-day calendar.*
 - *The benefit of having a shop calendar is that only realistic shop days will be used in the calculation of schedules.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Shop Calendar*
 - *A shop calendar gives a more accurate picture of expected completion dates since the nonworking days are removed from the picture.*
 - *A core requirement to implement CRP is the definition of the shop calendar.*
 - *This is usually done in the administrative function of the system.*
 - *Different shop calendars are usually available for different sites in a multiple-site ERP implementation.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Scheduling Options*
 - *Once an estimate has been made of available capacity, orders can be scheduled into position for completion in a variety of ways. Backward and forward scheduling*
 - *Backward scheduling starts from the desired finish date to calculate the start date.*
 - *Forward scheduling starts from today to determine the earliest possible finish date.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Scheduling Options*
 - *In either case, the resulting demand must be compared against the available capacity.*
 - *In some cases both of these scheduling approaches are used to minimize the lead-time in production.*
 - *There are two methods that are commonly used for loading against capacity:*
 - *Infinite loading and*
 - *Finite loading*

Operations Management

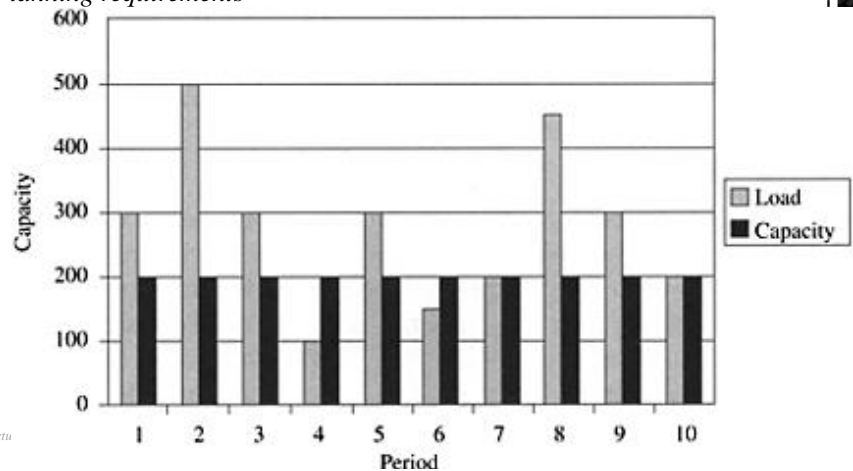
- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Infinite Loading*
 - *The biggest criticism of MRP systems is that they are capacity insensitive.*
 - *The netting and scheduling logic will schedule an order for completion regardless of the availability of capacity.*
 - *One of the MRP assumptions is that all input data are accurate and up to date.*
 - *The MPS to be realistic and accurate, the expected load must be compared to planned capacity.*
 - *The planner is required to level load the shop and typically watches critical work centers for overload.*
 - *The main job of the planner was to resolve the resource conflicts and smooth the shop loading.*

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Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Infinite Loading*



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Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Infinite Loading*
 - *Input/Output Control*
 - *Input/output control is a straightforward way to handle the bottleneck situation.*
 - *Orders are released only for the quantity of work that has been completed through the bottleneck.*
 - *Process improvement is focused on this bottleneck to reduce the amount of time required.*
 - *Buffering this work center with some backlog of work ensures that it will not run out of work and therefore adversely impact the entire output of the plant.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Finite Loading*
 - *The answer to the traditional capacity insensitivity of MRP and CRP is finite loading.*
 - *Even more sophisticated than finite loading is finite scheduling, as used in APS systems.*
 - *The simpler finite loading method will never exceed the available capacity of a work center during scheduling.*
 - *If the capacity is already allocated, the system will move the order forward or backward, depending on the scheduling rule, to find an available spot.*

Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*

A review of mathematical programming models for strategic capacity planning in manufacturing

Carme Martínez-Costa^{a,b*}, Marta Mas-Machuca^c, Ernest Benedito^{a,b}, Albert Corominas^{a,b}

^a Institut d'Organització i Control de Sistemes Industrials (IOC)

^b Departament d'Organització d'Empreses. Universitat Politècnica de Catalunya (UPC)

^c Departament d'Organització d'Empreses. Universitat Internacional de Catalunya (UIC)



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Operations Management

- *Material and capacity requirements Planning:*
 - *Capacity Requirement Planning requirements*
 - *Finite Loading*
 - *Since computers are very good at calculating numbers, computing and scheduling according to this rule is computationally easy.*
 - *However, real life sometimes gets in the way with less than precise estimates of the routing times, utilization factors, and efficiency factors.*
 - *After capacity has been planned, feedback to the plan is required to close the loop.*
 - *Demonstrated capacity is the proven capacity calculated from actual performance data.*
 - *Adjustments to the efficiency factors are done through examination of the past-demonstrated capacity.*

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