AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Module name: Integration and coordination in operations management

Academic year: 2016/2017 Code: ZIPM-3-010-s ECTS credits: 3

Faculty of: Management

Field of study: Industrial Engineering of Non-Ferrous Metals Specialty: —

Study level: Third-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 0

Course homepage: —

Responsible teacher: dr hab. inż. Kaczmarczyk Waldemar (wkaczmar@zarz.agh.edu.pl)

Academic teachers: dr hab. inż. Kaczmarczyk Waldemar (wkaczmar@zarz.agh.edu.pl)

## Description of learning outcomes for module

| MLO code | Student after module completion has the knowledge/ knows how to/is able to | Connections with FLO | Method of learning outcomes verification (form of completion) |
|---|---|---|---|
| Skills | | | |
| M_U001 | Is able to recognise flaws in known optimisation models for operational planning and to define objectives of new research projects. | IPM3A_U04, IPM3A_U02, IPM3A_U03 | Examination |
| M_U002 | Is able to classify operational planning problem involving integration and coordination and apply appropriate model. | IPM3A_U04, IPM3A_U05 | Examination |
| Knowledge | | | |
| M_W001 | Understands the principle and significance of integration and coordination in operational management. | IPM3A_W02 | Examination |
| M_W002 | Knows basic models of operational planning problems involving integration and coordination. | IPM3A_W02, IPM3A_W03 | Examination |

## FLO matrix in relation to forms of classes

| MLO code | Student after module completion has the knowledge/ knows how to/is able to | Form of classes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lectures | Auditorium classes | Laboratory classes | Project classes | Conversation seminar | Seminar classes | Practical classes | Fieldwork classes | Workshops | Others | E-learning |
| Skills | | | | | | | | | | | | |
| M_U001 | Is able to recognise flaws in known optimisation models for operational planning and to define objectives of new research projects. | - | - | - | - | + | - | - | - | - | - | - |
| M_U002 | Is able to classify operational planning problem involving integration and coordination and apply appropriate model. | - | - | - | - | + | - | - | - | - | - | - |
| Knowledge | | | | | | | | | | | | |
| M_W001 | Understands the principle and significance of integration and coordination in operational management. | - | - | - | - | + | - | - | - | - | - | - |
| M_W002 | Knows basic models of operational planning problems involving integration and coordination. | - | - | - | - | + | - | - | - | - | - | - |

## Module content

**Conversation seminar**

Integration and coordination are very popular terms in operations management, although their meaning is not clear for many managers and scientists. In this course many different models of operational planning problems are presented and discussed in which coordination and/or integration play the key role. Finally the relationship and the sense of these two terms will be analysed.

1. Integrated production and distribution planning
• Classification of problems
• Production-Transportation Problems
• Lot-sizing and vehicle routing
• Machine scheduling and vehicle routing
2. Negotiation-based collaborative planning
3. Decomposition versus integration
4. Planning process in hierarchical systems
5. Single product, steady demand lot sizing
6. Multiple products, joint (coordinated) lot sizing .

### Method of calculating the final grade

Assessment (1 ECTS):
Written test. Requirements: a few basic planning problems and models, as well as general classification and basic properties of other considered problems and models.
Exam (3 ECTS):
Written exam. Requirements: all considered planning problems and models.

## Prerequisites and additional requirements

Basic mixed integer programming problems and models.

## Recommended literature and teaching resources

1. Adulyasak, Y., Cordeau, J.-F. and Jans, R. (2015). The production routing problem: A review of formulations and solution algorithms, Computers & Operations Research 55(0): 141-152.
2. Axster, S. (2001). A note on stock replenishment and shipment scheduling for vendor-managed inventory systems, Management Science 47(9): 1306-1310. URL: http://dx.doi.org/10.1287/mnsc.47.9.1306.9782
3. Benjamin, J. (1989). An analyst of inventory and transportation costs in a constrained network., Transportation Science 23(3): 177-183.
4. Çetinkaya, S. (2005). Coordination of inventory and shipment consolidation decisions: A review of premises, models, and justi cation, in J. Geunes, E. Akali, P. Pardalos, H. Romeijn and Z.-J. Shen (eds), Applications of Supply Chain Management and E-Commerce Research, Vol. 92 of Applied Optimization, Springer US, pp. 3-51.
5. Çetinkaya, S. and Lee, C.-Y. (2000). Stock replenishment and shipment scheduling for vendor-managed inventory systems, Management Science 46(2): 217-232. URL: http://dx.doi.org/10.1287/mnsc.46.2.217.11923
6. Chen, T.-H. and Chen, J.-M. (2005). Optimizing supply chain collaboration based on joint replenishment and channel coordination, Transportation Research Part E: Logistics and Transportation Review 41(4): 261-285. URL: http://www.sciencedirect.com/science/article/pii/S1366554504000481
7. Chen, Z.-L. (2004). Integrated production and distribution operations, in D. Simchi- Levi, S. Wu and Z.-J. Shen (eds), Handbook of Quantitative Supply Chain Analysis, Vol. 74 of International Series in Operations Research & Management Science, Springer US, pp. 711-745.
8. Dudek, G. (2004). Collaborative Planning in Supply Chains: A N? egotiation-based Approach, Lecture Notes in Economics Series, Springer-Verlag. URL: http://books.google.pl/books?id=GOpJL XZZxsC
9. Dudek, G. and Stadtler, H. (2005). Negotiation-based collaborative planning between supply chains partners, European Journal of Operational Research 163(3): 668-687. Supply Chain Management and Advanced Planning. URL: http://www.sciencedirect.com/science/article/pii/S0377221704000244
10. Erenguc, S. S., Simpson, N. C. and Vakharia, A. J. (1999). Integrated production/distribution planning in supply chains: An invited review, European Journal of Operational Research 115(2): 219-236.
11. Kaczmarczyk, W. (2008). Partial coordination may increase overall costs in supply chains, Decision Making in Manufacturing and Services 2(2): 47-62.
12. Kaczmarczyk, W., Sawik, T., Schaller, A. and Tirpak, T. (2006). Production planning and coordination in customer driven supply chains, Wybrane Zagadnienia Logistyki Stosowanej, Vol. 3, Komitet Transportu PAN, pp. 81-89.
13. Sarmah, S., Acharya, D. and Goyal, S. (2006). Buyer vendor coordination models in supply chain management, European journal of operational research 175(1): 1- 15.
14. Schneeweiss, C. (1999). Hierarchies in Distributed Decision Making, Springer.
15. Silver, E. A., Pyke, D. F. and Peterson, R. (1998). Inventory Management and Production Planning and Scheduling, Wiley.
16. Stadtler, H. (2009). A framework for collaborative planning and state-of-the-art, OR Spectrum 31(1): 5-30. URL: http://dx.doi.org/10.1007/s00291-007-0104-5
17. Ullrich, C. A. (2013). Integrated machine scheduling and vehicle routing with time windows, European Journal of Operational Research 227(1): 152-165.

## Scientific publications of module course instructors related to the topic of the module

1. Kaczmarczyk, W., Sawik, T., Schaller, A. and Tirpak, T. (2006). Production planning and coordination in customer driven supply chains, Wybrane Zagadnienia Logistyki Stosowanej, Vol. 3, Komitet Transportu PAN, pp. 81-89.
2. Kaczmarczyk, W. (2008). Partial coordination may increase overall costs in supply chains, Decision Making in Manufacturing and Services 2(2): 47-62.

3. W. Kaczmarczyk, Wybrane modele planowania wielkości i szeregowania partii produkcyjnych, Wydawnictwa AGH, seria Rozprawy i Monografie, nr 223, Kraków, 2011

### Additional information
None

## Student workload (ECTS credits balance)

| Student activity form | Student workload |
|---|---|
| Participation in conversation seminars | 14 h |
| Realization of independently performed tasks | 28 h |
| Summary student workload | 42 h |
| Module ECTS credits | 3 ECTS |