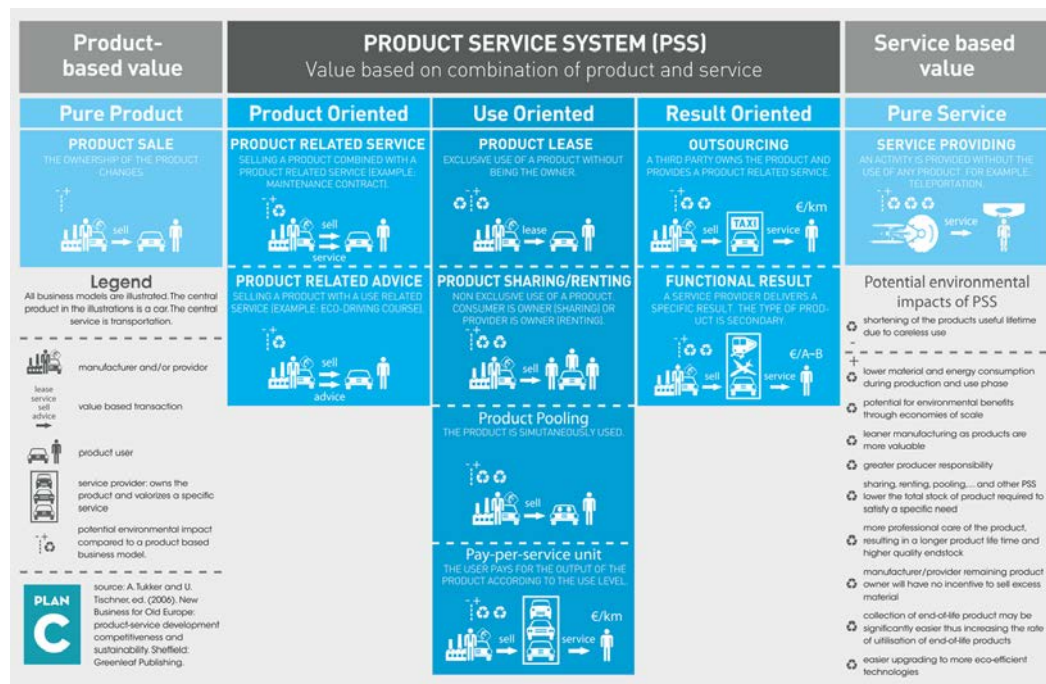


Course syllabus for

## P53: PSS Product-Service Systems

Syllabus adopted 2020-09-28 by Professor Bengt-Göran Rosén, Produktion2030 Head of Education



Credits	7.5 hec
Grading scale	Satisfactory/not satisfactory
Education cycle	Third-cycle
Examiner	Prof. Tobias Larsson and Docent Marco Bertoni, Blekinge Institute of Technology
Eligibility	A Master's degree in production/mechanical engineering or equivalent
Aim	The course aims to give an overview of the current strategies, methods and tools related to the design and implementation of Product-Service Systems in industry, as well as to highlight current and future areas of research in the PSS field.
Intended learning outcomes	On completion of the course, the student will be able to:

***Knowledge and understanding***

- describe and analyse how products and PSS solutions are developed.
- describe and analyse how the introduction of digital technologies impact the design or product/service solutions
- describe how the notion of PSS relates to the concepts of circular economy, sustainability, environmental protection and sharing economy.

***Competence and skills***

- discuss needs, trend and drivers for PSS initiatives;
- apply suitable research methods in the field of PSS;
- apply and reflect on the use of methodologies and processes supporting PSS development;
- apply and reflect on methods/tools for managing engineering knowledge in the PSS design process;
- apply and reflect on the use of advanced simulation-driven design tools for PSS monitoring and design;
- verbally and in writing describe and reflect on their findings and conclusions - in dialogue with other students.

***Judgement and approach***

- analyse, reflect on, and argue for the benefits of PSS initiatives, regarding customer desirability, technical feasibility, and commercial viability of the PSS;
- analyse and explain PSS initiatives in terms of how they contribute to sustainable development (environmental, social, economic).

**Course content**

The contents of the course are the following:

- Product-Service Systems: drivers and key definitions.
- PSS implementations in industry.
- Knowledge sharing for PSS design.
- PSS Research Methodology.
- PSS modelling and simulation.
- PSS as an innovation model.
- PSS for resource-limited societies.

- PSS and circular economy.
- Digital technologies for PSS.

#### Course organisation

The course intention is to organise two physical meetings to kick-off and conclude the course, together with eight online lectures with possibility to attend physically for the doctoral students located at Blekinge Institute of Technology.

- L1\_Product-Service Systems: drivers and key definition (Tobias Larsson). An introduction to the main trends, challenges, drivers, concepts and definitions for Product-Service Systems.
- L2\_PSS implementations in industry (Tobias Larsson) A review of successful (and less successful) industrial PSS implementations.
- L3\_Knowledge sharing for PSS design (Marco Bertoni) A review of how PSS impact the sharing of knowledge in the cross-functional engineering team.
- L4\_PSS Research Methodology (Alessandro Bertoni) A review of how the Design Research Methodology is used to provide rigor to the research in the PSS field.
- L5\_PSS as a business and innovation model (Christian Johansson Askling) A introduction to the business and innovation models underlying the PSS transition.
- L6\_PSS modelling and simulation (Marco Bertoni) A review of the most popular approaches and techniques to simulate PSS processes.
- L7\_SPSS for resource-limited societies (Santosh Jagtap) An introduction to the key guidelines for designing integrated solutions to support development of marginalized societies.
- L8\_Digital technologies for PSS (Giuditta Pezzotta) A review and a research agenda related to the introduction of digital technologies in the PSS domain.
- L9\_PSS vs. circular economy: similarities and differences (Daniela Pigosso) A discussion on how to decouple economic growth from resource consumption through PSS. See [12].
- L10\_Case discussions and final presentation (Tobias Larsson)

#### Examination

A successful completion of this course will be judged on the successful submission and approval of the following assignments:

- Approved write-up, and oral presentation of chosen literature
- Approved application report (case study) including oral presentation
- Approved reflection report
- Approved opposition on another group presentation

## Literature

A collection of relevant book chapters, research papers and other readings for each addressed topic will be handed out during the course. These will include the following:

- Aurich, J. C., Fuchs, C., & Wagenknecht, C. (2006). Life cycle oriented design of technical Product-Service Systems. *Journal of cleaner production*, 14(17), 1480-1494.
- Bertoni, A., Bertoni, M., Panarotto, M., Johansson, C., & Larsson, T. C. (2016). Value-driven product service systems development: Methods and industrial applications. *CIRP Journal of Manufacturing Science and Technology*, 15, 42-55.
- Kjaer, L. L., Pigosso, D. C., Niero, M., Bech, N. M., & McAloone, T. C. (2019). Product/service - systems for a circular economy: the route to decoupling economic growth from resource consumption?. *Journal of Industrial Ecology*, 23(1), 22-35.
- Jagtap, S. (2019). Key guidelines for designing integrated solutions to support development of marginalised societies. *Journal of Cleaner Production*, 219, 148-165.
- Pirola, F., Boucher, X., Wiesner, S., & Pezzotta, G. (2020). Digital technologies in product-service systems: a literature review and a research agenda. *Computers in Industry*, 123, 103301.
- Tukker, A., & Tischner, U. (Eds.). (2017). *New business for old Europe: product-service development, competitiveness and sustainability*. Routledge.