University of St.Gallen

Course and Examination Fact Sheet: Spring Semester 2025

8,047: Evaluating Innovation in Companies and at System Level

ECTS credits: 3

Overview examination/s
(binding regulations see below)
decentral - Written work, Digital, Group work group grade (40%)
Examination time: Term time
decentral - Presentation, Analog, Group work group grade (40%)
Examination time: Term time
decentral - Written work, Digital, Individual work individual grade (20%)
Examination time: Term time

Attached courses
Timetable -- Language -- Lecturer
8,047,1.00 Evaluating Innovation in Companies and at System Level -- English -- Vogel Justus

Course information

Course prerequisites

Basic knowledge and understanding of statistics, and an interest in healthcare are required. Interest in machine learning methods is a plus.

No specific knowledge of the healthcare system as prerequisite.

Learning objectives
1. Students are able to analyze the effects the implementation of an innovation has had on a company (e.g., a hospital) or on a system (e.g., the hospital sector or the health system as a whole).
2. Students are able to select evaluation methodologies fitting the empiric context and perspective of an evaluation.
3. Students are able to understand, analyze, and refine complex processes such as patient pathways within hospitals and across different providers of the healthcare system.
4. Students are able to reflect implementation decisions of innovative services or products.
5. Students are able to derive recommendations for or against implementing an innovation using the results of quantitative analysis methods.
6. Students will be able to read, understand, and critically appreciate evaluation studies in healthcare and beyond (e.g., manufacturing contexts).

Course content

Companies spend considerable time on discussing what innovation to invest into. While this is an important activity, it seems odd that a lot less time is spent on evaluating if the innovation, e.g., a new production planning software, or new machinery, actually fulfilled its promises.

This course treats the subject of quantitative evaluation of innovation. We interpret "Innovation" broadly, from introducing new rules and decision policies as part of a software (e.g., for planning surgeries in a hospital) to new machinery and technology (e.g., using a robotic-assisted surgery system).

We focus on healthcare, specifically the hospital sector, as application example. Where suitable, examples from other industries will also be discussed. Healthcare is an exceptional application example, as the goals of introducing an innovation differ between stakeholders (patients, medical professionals, managers, health insurances, canton, etc.). We will learn how to address these different perspectives, including how to measure the different outcomes relevant to these stakeholders.

Course structure and indications of the learning and teaching design

This course counts 3 credits. Accordingly, the total workload for students is 90 hours. This includes self-study, campus time and all examinations.

The structure of the contact study is planned as follows: 1.5 hours of lectures in a weekly rhythm for 12 weeks, i.e., 18 hours in total. In some classes, 30-45 min will be used to discuss the solutions of graded assignments (examination part 3). The course is conducted in presence in St. Gallen.

The structure of the self-study is intended as follows: 22 hours of preparation time for the lectures, 20 hours for the examination part 1, 20 hours for the examination part 2, and 10 hours for the examination part 3.

Topics of the classes are:

1. Introduction to the health system and economic evaluation
2. Measuring inputs and outputs in healthcare: Management and company level (1/2)
3. Measuring inputs and outputs in healthcare: Management and company level (2/2)
4. Measuring inputs and outputs in healthcare: System level
5. Evaluation methodologies and applications: Description, prediction, and causal inference
6. Evaluation methodologies and applications: Introduction to econometric methods (1/2)
7. Evaluation methodologies and applications: Introduction to econometric methods (2/2)
8. Evaluation methodologies and applications: Introduction to machine learning methods (1/2)
9. Evaluation methodologies and applications: Introduction to machine learning methods (2/2)
10. Evaluation methodologies and applications: Reviewing evaluation studies (1/2)
11. Evaluation methodologies and applications: Reviewing evaluation studies (2/2)
12. Journal Club: Presentation and critical reflection of an evaluation study

Course literature

Yılmaz, Ö., Son, Y., Shang, G., & Arslan, H. A. (2024). Causal inference under selection on observables in operations management research: Matching methods and synthetic controls. Journal of Operations Management, 70(5), 831–859. https://doi.org/10.1002/joom.1318

Drummond et al. (2015): Methods for the Economic Evaluation of Health Care Programmes, Oxford: University Press, 4th edition.

Prosperi, M., Guo, Y., Sperrin, M., Koopman, J.S., Min, J.S., He, X., Rich, S., Wang, M., Buchan, I.E., Bian, J., 2020. Causal inference and counterfactual prediction in machine learning for actionable healthcare. Nature Machine Intelligence 2020 2:7 2, 369–375. https://doi.org/10.1038/s42256-020-0197-y

Lu, G., Ding, X. (David), Peng, D.X., Hao-Chun Chuang, H., 2018. Addressing endogeneity in operations management research: Recent developments, common problems, and directions for future research. Journal of Operations Management 64, 53–64. https://doi.org/10.1016/J.JOM.2018.10.001

Chou, Y.C., Chuang, H.H.C., Chou, P., Oliva, R., 2023. Supervised machine learning for theory building and testing: Opportunities in operations management. Journal of Operations Management 69, 643–675. https://doi.org/10.1002/JOOM.1228

Additional literature might be made available before each classes.

Additional course information

None.

Examination information

Examination sub part/s

1. Examination sub part (1/3)

Examination modalities

Examination type	Written work
Responsible for organisation	decentral
Examination form	Written work
Examination mode	Digital
Time of examination	Term time
Examination execution	Asynchronous
Examination location	Off Campus
Grading type	Group work group grade
Weighting	40%
Duration	--

Examination languages
Question language: English
Answer language: English

Remark
Reflection & recommendations for extending study

Examination-aid rule
Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

Supplementary aids
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2. Examination sub part (2/3)

Examination modalities

Examination type	Presentation
Responsible for organisation	decentral
Examination form	Oral examination
Examination mode	Analog
Time of examination	Term time
Examination execution	Asynchronous
Examination location	On Campus
Grading type	Group work group grade
Weighting	40%
Duration	--

Examination languages
Question language: English
Answer language: English

Remark
Presentation and reflection of evaluation study

Examination-aid rule
Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

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3. Examination sub part (3/3)

Examination modalities

Examination type	Written work
Responsible for organisation	decentral
Examination form	Written work
Examination mode	Digital
Time of examination	Term time
Examination execution	Asynchronous
Examination location	Off Campus
Grading type	Individual work individual grade
Weighting	20%
Duration	--

Examination languages
Question language: English
Answer language: English

Remark
3-6 Assignments throughout the course

Examination-aid rule
Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

Supplementary aids
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Examination content

Acquired (methodological) knowledge is applied in 3-6 practical assignments. These assignments will be made available after a lecture and be due one to three weeks afterwards (examination part 3). Moreover, students are asked to select an evaluation study from the scientific literature (on their own or from a provided list), present its findings, and its methodology (examination part 1). Lastly, students will develop recommendations on how to extend this study in a seminar paper (1'000-1'600 words) (examination part 2).

Examination relevant literature

All relevant examination literature will be made available on StudyNet before the third class on March 6th, 2025.

Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.
Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 13 (Monday, 25 March 2025) are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 23 January 2025);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 17 March 2025);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 14 (Monday, 31 March 2025);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before ending with de-registration period in CW 15 (Monday, 07 April 2025).