UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE TECNOLÓGICO
Programa de Pós-graduação em Engenharia de Produção
Campus Universitário Reitor João David Ferreira Lima - Trindade
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PLANO DE ENSINO

TRIMESTRE – 2022.1

1. IDENTIFICAÇÃO DA DISCIPLINA:

CÓDIGO	NOME DA DISCIPLINA	TURMA (S)	TOTAL DE HORAS-AULA SEMESTRAIS
EPS 410104	*Theory and Applications of Data Science and Artificial Intelligence in Operations Management - AIOM*	ME/DO	Presencial: 25 Remota Síncrona: 20 Total: 45

2. PROFESSOR(ES) MINISTRANTE(S)

Enzo Morosini Frazzon (enzo.frazzon@ufsc.br)
Mirko Kueck (mirkokueck@googlemail.com)

3. PRÉ-REQUISITO(S)

CÓDIGO	NOME DA DISCIPLINA
EPS510043	Sistemas Produtivos e Logísticos Inteligentes

4. EMENTA

Conceitos teóricos de ciência de dados e inteligência artificial. Aplicações da Ciência de Dados na Gestão de Operações. Aplicações da Inteligência Artificial na Gestão de Operações.
Theoretical concepts of data science and artificial intelligence. Applications of Data Science in Operations Management. Applications of Artificial Intelligence in Operations Management.

5. OBJETIVOS

This class will deal with the main theoretical concepts of data science and artificial intelligence. The described methods will be applied to examples from industry and operations management, such as condition-based and predictive maintenance, product quality control, customer demand forecasting and inventory control. After a general introduction and overview of the classes, the cross-industry-process for data mining (CRISP-DM) will be explained as a reference model for data science projects in practical applications. Afterwards, the main concepts of supervised machine learning and artificial intelligence will be explained. For the practical exercises, the programming language Python will be used, which will be installed and practiced at the beginning of the first class.

6. CONTEÚDO PROGRAMÁTICO

1. Overview about the complete class and introduction to Python
2. CRISP-DM and general concepts
3. Exploratory Data Analysis, Descriptive Statistics
4. Visualization
5. Supervised Learning in general
6. Classification
7. Ensemble Learning
8. Feature Selection, Emergence

9. Regression
10. Time Series Forecasting
11. Artificial Intelligence
12. Inventory Simulation as an AI application

7. METODOLOGIA DE ENSINO

Aulas expositivas presenciais ou síncronas (por webconferência). Atividades complementares assíncronas para fixação do conteúdo exposto. A frequência será aferida pela comprovação da realização das atividades propostas.

8. AVALIAÇÃO

No decorrer do semestre, serão realizadas avaliações individuais. Na avaliação serão retomados os objetivos específicos da disciplina da seguinte forma:
20% - Participação em aula.
80% - Realização das atividades da disciplina: artigo.

9. CRONOGRAMA E CARGA HORÁRIA

Semana	Data	Conteúdo básico	hs Presencial	hs Síncrono	hs Assíncron
1	08/mar	Overview about the complete class and introduction to Python	2		
2	15/mar	CRISP-DM and general concepts	3		
3	22/mar	Exploratory Data Analysis, Descriptive Statistics	4		
4	29/mar	Visualization	4		
5	05/abr	Supervised Learning in general	4		
6	12/abr	Classification		4	
7	19/abr	Ensemble Learning		4	
8	26/abr	Feature Selection, Emergence		4	
9	03/mai	Regression		4	
10	10/mai	Time Series Forecasting		4	
11	17/mai	Artificial Intelligence		4	
12	24/mai	Inventory Simulation as an AI application	4		

10. BIBLIOGRAFIA BÁSICA (disponível no moodle)

Burkov, A. (2019). The Hundred-Page Machine Learning Book. Andriy Burkov, Quebec City, Canada.

Russell, S. J., Russell, S., und Norvig, P. (2021). Artificial Intelligence: A Modern Approach. Pearson series in artificial intelligence. Pearson, Hoboken, NJ.

VanderPlas, J. (2016). Python data science handbook: Essential tools for working with data. " O'Reilly Media, Inc.". https://jakevdp.github.io/PythonDataScienceHandbook/

VanderPlas, J. (2016). A Whirlwind Tour of Python. O'Reilly, https://jakevdp.github.io/WhirlwindTourOfPython/

Python 3.10.2 documentation. https://docs.python.org/3/

11. BIBLIOGRAFIA COMPLEMENTAR

Bishop, C. M. (2006). Pattern Recogniton and Machine Learning. Springer-Verlag New York.

Donoho, D. (2017). 50 Years of Data Science. Journal of Computational and Graphical Statistics, 26(4):745–766.

Hastie, T., Tibshirani, R., und Friedman, J. (2009). The Elements of Statistical Learning. Springer Series in Statistics. Springer, New York, NY, USA.

Hyndman, R. J. und Athanasopoulos, G. (2018). Forecasting: principles and practice. OTexts, Melbourne, Australia.

Kück, M., Crone, S., und Freitag, M. (2016b). Meta-learning with neural networks and landmarking for forecasting model selection an empirical evaluation of different feature sets applied to industry data. In Proceedings of the International Joint Conference on Neural Networks, 1499–1506. IEEE.

Kück, M. und Freitag, M. (2021). Forecasting of customer demands for production planning by local k-nearest neighbor models. International Journal of Production Economics, 231:107837

Shmueli, G. (2010). To Explain or to Predict? Statistical Science, 25(3):289–310.

Kaggle. https://www.kaggle.com/

UC Irvine Machine Learning Repository. https://archive.ics.uci.edu/ml/index.php

Towards Data Science. https://towardsdatascience.com/