



आपदा न्यूनीकरण एवं प्रबन्धन उत्कृष्टता केन्द्र, भारतीय प्रौद्योगिकी संस्थान रुड़की,

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CENTRE OF EXCELLENCE IN DISASTER MITIGATION & MANAGEMENT, 3<sup>rd</sup> Floor,  
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1. Subject Code : **DMN-604** Course Title : **Instrumentation and Data Mining Techniques**
2. Contact Hours: **L: 3 T: 2 P: 0**
3. Examination Duration (Hrs.) : **Theory: 3 Practical: 0**
4. Relative Weightage: **CWS 25 PRS 0 MTE 25 ETE 50 PRE 0**
5. Credits: **4** 6. Semester: **Spring** 7. Subject Area: **PEC**
8. Pre-requisite: **Nil**
9. Objective: To impart knowledge of basic principles, methods, and applications of instrumentation, data processing and data mining
10. Details of Course :

Sl. No.	Particulars	Contact Hours
1.	Seismic instrumentation, ground motion measurement, instrumentation of structures	2
2.	Theory of seismic sensors - seismographs, strong motion accelerographs, SRRs; Equation of motion, characteristics, calibration and use	4
3.	Sampling theorem, anti-aliasing filter, recording system, networking and data transmission	4
4.	Processing of recorded data, noise, transducer correction, low pass and high pass filters	4
5.	Real time engineering seismology, shake maps, early warning systems	2
6.	Response spectra, Fourier spectra, spectrum compatible time history	4
7.	Introduction to data mining, seismic instrumentation, displacement, velocity, and accelerometers, adjustment and interpretation of recorded data	2
8.	Data preparation for knowledge discovery, data understanding, data cleaning, data transformation, discretization, feature selection	5
9.	Classification and regression - Maximum likelihood methods, Bayesian methods, Decision Tree classification; Neural Networks	8
10.	Clustering - K-means, hierarchical clustering, self organizing feature maps, principal component analysis	4
11.	Evaluation and visualization - Classification with train, test and validation sets, cross-validation, bootstrap, 1,2 and 3 D visualization of data	3
	<b>Total</b>	<b>42</b>

11. Suggested Books :

Sl. No	Name of Authors/Book/Publisher	Year of Publication / Reprint
1.	Stearns S.D., Digital Signal Processing with Examples in MATLAB, Prentice Hall	2003
2.	Hano D., Mamnila H and Synth P., Data Mining, Prentice Hall of India	2004
3.	Newnes , Digital Signal Processing : A Practical Guide for Engineers and Scientists, Elsevier Science	2003
4.	Agarwal P. and Shrikhande M., Earthquake Resistant Design of Structures, Prentice Hall of India	2006
5.	Dunham M.H., Data Mining: Introductory and Advanced Topics, Prentice Hall	2003