INDIAN INSTITUTE OF TECHNOLOGY MANDI

KAMAND, DISTT. MANDI – 175005 (HIMACHAL PRADESH)

MINUTES OF 20TH BOARD OF ACADEMICS MEETING

VENUE : A-4 CONFERENCE ROOM, KAMAND

DATE : 1ST DECEMBER, 2017 (FRIDAY)

TIME : 03:00 P.M.

Following members attended the meeting

Sl.No.		Name	
1.	Dean Academics	Prof. B.D. Chaudhary	**Chairman**
2.	Associate Dean (Research)	Dr. Venkata Krishnan	Member
3.	Associate Dean (Courses)	Dr. Pradeep Parameswaran	Member
4.	Chairman Library Advisory Committee	Dr. Astrid Kiehn	Member
5.	Chairman Course Proposal Committee + Course Coordinator M.Sc. (Chemistry)	Dr. Chayan K Nandi	Member
6.	Course Coordinator (IC Courses)	Dr. Aniruddha Chakraborty	Member
7.	Course Coordinator (SHSS Courses) + Nominee (SHSS)	Dr. Shyamasree Dasgupta	Member
8.	Course Coordinator (B.Tech.-EE)	Dr. Subashish Datta	Member
9.	Course Coordinator (B.Tech.-CE)	Dr. D.P. Shukla	Member
10.	Course Coordinator (M.Tech.- (Energy Engg. (Materials))	Dr. Atul Dhar	Member
11.	Course Coordinator (M.Tech.-(Mechanical Engg. (Energy Systems))		Member
12.	Course Coordinator (M.Tech.-(Communication and Signal Processing))	Dr. Renu M Rameshan	Member
13.	Course Coordinator (M.Tech.-Biotechnology)	Dr. Shyam K Masakpalli	Member
14.	Course Coordinator (M.Sc.-Applied Maths)	Dr. Nitu Kumari	Member
15.	Course Coordinator (M.Sc.-Physics)	Dr. Chander Shekhar Yadav	Member
16.	Nominee-1: School of Engineering	Dr. Rajesh Ghosh	Member
17.	Nominee-1: School of Computing & Electrical Engineering	Dr. Kunal Ghosh	Member
18.	Nominee-2: School of Computing & Electrical Engineering	Dr. Aditya Nigam	Member
19.	Nominee-1: School of Basic Sciences	Dr. Syed Abbas	Member
20.	Nominee-2: School of Basic Sciences	Dr. Prosenjit Mondal	Member
21.	Academic Affairs Secretary	Mr. J Raghunath	Member
22.	Research Affairs Secretary	Ms. Manushree	Member
23.	Assistant Registrar (Academics): Secretary	Mr. Suresh Rohilla	Secretary

Following members could not attend the meeting

1.	Nominee-1: School of Humanities & Social Sciences	Dr. Ashok Kumar	Member
2.	Industry Member - 1	Dr. NadeemAkhtar	Member
3.	Course Coordinator (B.Tech.-CSE)	Dr. Dileep A D	Member
4.	Course Coordinator (B.Tech.-ME)	Dr. Arpan Gupta	Member
5.	Course Coordinator (M.Tech.-(VLSI))	Dr. Satinder Sharma	Member
6.	Course Coordinator (M.Tech.-(Power Electronics and Drives))	Dr. Narsa Reddy Tummuru	Member
7.	Course Coordinator (I-Ph.D.(Physics))	Dr. Hari Varma	Member
8.	Nominee-2: School of Engineering	Dr. Venkata Uday Kala	Member

Special Invitee

1.	Dr. Manoj Thakur	Asst. Prof., SBS
2.	Dr. Srikant Srinivasan	Asst. Prof., SCEE
3	Dr. KS Kasiviswanathan	Asst. Prof., SE
4	Dr. Hitesh Shrimali	Asst. Prof., SCEE
5	Dr. Rajiv Kumar	Asst. Prof. SE

PART-A

(Issues discussed by the Board of Academics when the Student Members were present)

20.1 To deliberate on new courses to be offered in forthcoming semester (Feb-Jun 2018) which are not approved by the Senate:

The Chairperson, CPC presented 03 new course proposals for consideration and approval of BoA. After discussions, the following 03 courses were recommended by the BoA for approval to the Senate. The final course descriptions after incorporating the suggested changes are placed at Annexure-"A":

Sl. No.	Course No.	Course Title	Credits L-T-P-C	Proposed by	School
1	EE 592P	Selected topics in IoT	0-1-2-2	Dr. Srikant Srinivasan	SCCE
2	CE 510	Modelling and Simulation in Water Resources Engineering	2-0-2-3	Dr. KS Kasiviswanathan	SE
3	MA 525	Heuristic Optimization	3-0-0-3	Dr. Manoj Thakur	SBS

20.2 To consider a proposal for M.Tech in VLSI

The Board of Academics deliberated on the draft proposal for M.Tech (VLSI) presented by Dr. Hitesh Shrimali. BoA deferred the proposal with suggestions that more inputes from Industry and other stake holders be obtained and recorded formally. Theory and Lab credits should be reviewed and Internship may be incorporated as part of course work.

20.3 To revisit process and guidelines followed by Comprehensive Examination Committees:

AD (Research) briefed the Board on existing guidelines and practice being followed by Comprehensive Examination Committees. Suggestions from the members were sought on category of rankings awarded, need for numerical grades and possibilities of clubbing written and oral exam parts etc. Taking due deliberations, draft of amended guidelines proposed is placed at Annexure "B". The BoA recommended the same for consideration by Senate.

20.4 To revisit and deliberate on the process followed by JRF to SRF Conversion Committees:

AD (Research) briefed the Board on existing guidelines and practice being followed by the JRF to SRF Conversion Committees. After deliberations, Chair BoA constituted a Sub-Committee consisting of the following members to compile comments from all stake holders and submit a draft of guidelines for further deliberation of BoA.

Dr. Venkata Krishnan, Asst. Prof.	- Chairperson
Dr. Manoj Thakur, Asst. Prof.	- Member

The meeting ended with a vote of thanks to the Chair.

Secretary, Board of Academics

08.12.17

Chairman, Board of Academics

IIT Mandi
Proposal for a New Course

Course Number	: CE 510
Course Name	: Modelling and Simulation in Water Resources Engineering
Credits	: L-T-P-C (2-0-2-3)
Prerequisites	: Water Resources Engineering (CE 303)
Intended for	: B. Tech (3rd/ 4th Year)/ MS/ PhD (Civil Engineering)
Distribution	: Discipline Elective (UG); Elective (PG/ MS/ PhD)
Semester	: Odd/Even

---

1. Preamble:

Simulation model in water resources engineering/management is mainly developed for abstracting the hydrologic system through mathematical modelling aided with computer programming. This course will help the students to understand how hydrologic models are developed in different stages such as identifying the input data requirement and pre-processing, determination of model parameters through calibration, evaluating the accuracy of developed models through statistical measures, understanding the importance of uncertainty in hydrologic models and its quantification.

This course contains theory part as well as tutorial sessions. In the tutorial session, the students will gain the exposure in developing hydrologic models using MATLAB programming and open source hydrologic models/ software.

2. Course Modules with Quantitative lecture hours:

Module 1 **(6 Contact Hours)**

Introduction

Principles of simulation, nature and role of simulation in water resources engineering. Systems, models and simulation, Classification of simulation models: discrete and continuous simulation models, black box models, conceptual models, lumped and distributed models Steps involved in developing simulation models demonstrated through simple water balance model - model identification, parameter estimation – least square method for hydrologic models, brute force method, calibration and validation.

Model 2 **(4 Contact Hours)**

Watershed simulation

Watershed and delineation; watershed characteristics; Lumped hydrologic model: HyMOD– Model conceptualization, calibration and validation Distributed hydrologic model: Simulation by physically based models – St. Venant equations; HySIM – Model conceptualization, calibration and validation

Module 3 **(4 Contact Hours)**

Urban run-off models

Introduction to urban hydrology; Developing models for deriving IDF curve, runoff calculation and drainage network design; Strom water drainage system simulation using SWMM model including conceptualization, calibration and validation

Module 4 **(4 Contact Hours)**

Data driven models:

Black box models in hydrology; Developing artificial neural network based rainfall-runoff models, model calibration and validation

Module 5 **(6 Contact Hours)**

Reservoir simulation models

Reservoir operation policy; Developing models for determination of reservoir storage capacity, reservoir operation – deriving operational rule curves

Module 6 **(4 Contact Hours)**

Uncertainty analysis–

Monte Carlo simulation, Perturbation method, bootstrap method, first order uncertainty analysis (FOUA)

Lab sessions:

1. Developing simple water balance model (Calibration – Validation) **(4 Hours)**
2. Calibration of Hymod model parameters **(3 Hours)**
3. Developing models for storm water drainage network **(4 Hours)**
4. Developing ANN models, calibration and validation **(4 Hours)**
5. Developing simulation models to fix reservoir capacity **(3 Hours)**
6. Developing simulation models for deriving rule curves of reservoir **(4 Hours)**
7. Bootstrap methods **(3 Hours)**
8. FOAU and Perturbation methods **(3Hours)**

3. Text book:

a) Loucks, D.P. and Eelco van Beek (2005). Water Resources Systems Planning and Management - an introduction to methods, models and applications, Studies and Reports in Hydrology, UNESCO Pub.

b) Rajasekaran Pai S, G. A Vijayalakshmi (2004). Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, PHI Learning

4. References:

a) Yeou-Koung Tung, Ben-Chie Yen (1993). Reliability and Uncertainty Analyses in Hydraulic Design, ASCE Publication

b) Averill Law (2017) Simulation modelling and analysis, McGraw Hill Education; 4th Edition

c) The manuals for hydrologic models HySIM, HyMOD and SWMM can be referred and the same will be provided during the tutorial session.

d) Rudra Pradap (2010). Getting Started with Matlab: A Quick Introduction for Scientists and Engineers, Oxford University Press

e) Chow, V.T., Maidment, D.R. and Mays, L.W. (1988). Applied Hydrology, McGraw-Hill International Editions, Civil Engineering Series

5. Similarity Content Declaration with Existing Courses:

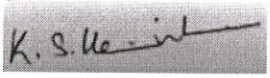
S.N.	Course Code	Similarity Content	Approx. % of Content
1	CE 303	IDF Curve	5%
2	CS 611	Mathematical foundations and learning mechanisms	5%
3	ME 620	Modeling and Simulation	5%

6. Justification for new course proposal if cumulative similarity content is > 30%:
Not applicable

Approvals:

Other Faculties interested in teaching this course: Dr Deepak Swami

Proposed by: Dr Kasiviswanathan K S School: SE

Signature:  Date: 04-12-2017

Recommended/Not Recommended, with Comments:

_____ Date: _____
Chairman, CPC

Approved / Not Approved

_____ Date: _____
Chairman, Senate

Proposal for a New Course

Course Number	: EE592P
Course Name	: Selected topics in IoT
Credits	: 0-1-2-2 (L-T-P-C)
Prerequisites	: IC161 – Applied Electronics or equivalent; IC250 – Programming and Data Structure Practicum or equivalent; Consent of instructor required
Intended for	: B.Tech. (EE. & CSE) IV year/ PG
Distribution	: Elective for B.Tech. IV year, MS, MTech, PhD
Semester	: Even/Odd

1. Preamble:

Internet-of-Things is a rapidly expanding domain with applications in both the national and international context. This practicum course is intended to give the students a hands-on experience of end-to-end design and implementation of IoT-based systems. It covers issues related to data acquisition and practical deployment of IoT-based systems, connecting the sensors to the cloud, and analytics on the cloud. The course will involve 12 weekly laboratory sessions and one final project. By the end of the course students will be proficient in interfacing sensors with common microcontrollers such as Arduino and Raspberry Pi, enabling device-to-device communications, real time data acquisition and hardware control through sensor networks, and connecting the physical systems to a cloud computing platform.

2. Course Modules with Quantitative lecture hours:

Module 1: Hardware components of IoT systems: Introduction to microcontrollers including PIC, Arduino, Raspberry Pi; interfacing sensors and actuators with microcontrollers, building breadboard circuits, using IoT CAD tools; performance characteristics, drift, measurement techniques, packaging; edge analytics and sensor control; **[6 tutorial hours + 12 lab hours]**

Module 2: Networking of devices: Device-to-device communication; networking protocols and architectures; scheduling and routing; wired and wireless (Bluetooth, Zigbee, NFC) sensor networks; communication technologies like LoRA, SigFox, Cellular IoT; transferring data to the cloud; **[5 tutorial hours + 10 lab hours]**

Module 3: Final Project: Creation of application specific (e.g. agriculture, river monitoring, disaster prediction etc.) IoT systems integrating components from modules 1-2 listed above. **[3 tutorial hours + 6 lab hours]**

3. Text book:

- Donald Norris, "The Internet of Things", McGraw Hill Education, 2015.
- Peter Waher, "Learning the Internet of Things", Packt Publishing Ltd, 2015.

4. Reference Books:

- Upton and Halfacree, "Raspberry Pi User Guide", Wiley, 2014.

- Robert Faludi, "Building Wireless Sensor Networks" O'Reilly Media, 2011.

5. Similarity Content Declaration with Existing Courses:

S.N	Course Code	Similarity Content	Approx % of content
1	Embedded Systems (EE529)	Interfacing sensors with Micro-controllers	20%

6. Justification for new course proposal if cumulative similarity content is > 30%: N.A.

Approvals:
Other faculty who may be interested in teaching this course: Dr. Siddhartha Sarma

Proposed by: Dr. Srikant Srinivasan School: SCEE

Signature: _____ Date_____

Recommended/Not Recommended, with Comments:

_____ Date:_____
Chairman, CPC

Approved / Not Approved
_____ Date:_____
Chairman, Senate

Indian Institute of Technology Mandi
Proposal for a New Course

Course Number	:	MA 525
Course Name	:	3-0-0-3
Credits	:	Heuristic Optimization
Prerequisites	:	IC150, IC111 or equivalent / instructor's consent.
Intended for	:	B.Tech. 3rd , 4th year, M.S./M.Tech./M.Sc., Ph.D.
Distribution	:	Elective
Semester	:	Odd/Even

Preamble : In the last three decades heuristic optimization techniques have emerged as very effective alternative in solving many complex optimization problems that are difficult to solve by traditional optimization techniques. This course aims to provide a comprehensive background in the area of heuristic optimization. The course contains theoretical foundations and computational details of various algorithms. To enrich the learning of the students, implementation issues and their affect on the performance of various algorithms would be discussed with help of programming exercises.

At the end of the course, students are expected to present and submit a project report related to the problem assigned/chosen.

On completion of this course, the student are expected to

- as an user, to select the most adequate method for his/her problem at hand;
- as a researcher, to design an optimization method suitable for a given class of problems, and to perform fair comparisons.

Course Modules with Quantitative Lecture Hours:

Module 1: **Introduction:** Introduction to optimization, Local and Global Minima, Classical Optimization Techniques, Heuristic Optimization techniques. (2 lecture hours)

Module 2: **Random number generations:** Random numbers of a given distribution, properties and statistical tests. Simulation of random number generators. (4 lecture hours)

Module 3: **Benchmarks and algorithms comparisons:** Parameter settings and statistical criterion for comparison of various algorithms, parametric and non parametric tests, non statistical measures and (4 lecture hours)

issues with them.

Module 4: **Continuous Optimization:** Evolutionary Techniques, Swarm based Techniques and other nature inspired techniques. Theoretical foundations of various techniques. Implementation issues with various techniques and their comparisons based on benchmarks. (8 lecture hours)

Module 5: **Discrete and combinatorial Optimization:** Heuristic optimization approaches for discrete, mixed continuous discrete and combinatorial problems. Application to solve Knapsack, TSP, Network Flow problems, Submodular Functions under Matroid Constraints. (4 lecture hours)

Module 6: **Estimation of Distribution Algorithms:** EDA for discrete optimization and their comparisons, continuous EDA, Application of discrete and continuous EDA in optimization and machine learning. (4 lecture hours)

Module 7: **Hybrid techniques:** Local search methods and their advantages. Hybrid optimization techniques. Use of hybrid techniques and their application. (4 lecture hours)

Module 8: **Constraint handling techniques:** Problems with inequality and equality constraints. Methods based on rejection strategies, repair strategies, specialized operators. Penalty parameter based and penalty parameter less approaches. Approaches for handling equality constraints. Implementation of various constraint handling techniques and their comparison over various practical and benchmark problems. (6 lecture hours)

Module 9: **Multi objective optimization**: Various approaches to handle multiple objectives, Pareto Optimality. Dominance and decomposition based approaches. Hybrid techniques. Bi-level optimization. Theoretical Foundations and Applications to engineering and finance. (6 lecture hours)

Textbooks:

1. Engelbrecht, Andries P., *Fundamentals of computational swarm intelligence.* John Wiley & Sons, 2006.
2. Deb, K., *Multi-objective optimization using evolutionary algorithms.* John Wiley & Sons, 2001.

Reference Books:

1. Mezura-Montes, E. (Ed.), *Constraint-Handling in Evolutionary Optimization Constraint-Handling in Evolutionary Optimization*, Studies in Computational Intelligence, vol. 198, Springer-Verlag, 2009.
2 Eiben, A.E. and Smith, J.E., *Introduction to Evolutionary Computing*, Springer, Berlin, 2003.
3. Niederreiter, H. *Random number generation and quasi-Monte Carlo methods.* Society for Industrial and Applied Mathematics, 1992.
4. Coello, C. A. C., Lamont, G. B., and Veldhuizen, D. A. V., *Evolutionary algorithms for solving*

multi-objective problems. Vol. 5. Springer, 2007.
5. Datta, R., and Deb, K. (Eds.), *Evolutionary constrained optimization*. Springer, 2014.
6. Lobo, F. J., Lima, C. F., and Michalewicz, Z. (Eds.), *Parameter setting in evolutionary algorithms*. Vol. 54, Springer Science & Business Media, 2007.
7. Blum, C., Roli, A. and Sampels, M. (Eds.), *Hybrid metaheuristics: an emerging approach to optimization*. Springer, 2008.
8. Larrañaga, P. and Lozano, J. A. (Eds). *Estimation of distribution algorithms: A new tool for evolutionary computation*. Springer Science & Business Media, 2012.
9. Clerc, M., *Guided randomness in optimization*. Vol. 1. John Wiley & Sons, 2015.
10. Wolsey, L. A., and Nemhauser, G. L., *Integer and Combinatorial Optimization*, Wiley, 1999.
11. Zbigniew M. and Fogel, D., *How to Solve it: Modern Heuristics*, Springer Verlag, 2000.

Similarity content declaration with existing courses:

Sl. No.	Course Code	Similarity Content	Approximate % of Content
1.	MA 651	Evolutionary Optimization Techniques (Binary Genetic Algorithms)	<10%

Justification for new course proposal if cumulative similarity content is > 30%:
Not Applicable.

Approvals:

Other faculty interested in teaching this course: Dr. Samar
Proposed by: Dr. Manoj Thakur

School: School of Basic Sciences (SBS)

Signature: Date: 06-11-2017

Recommended / Not Recommended, with comments:

Chairman, CPC Date:

Approved / Not Approved:

Chairman, Senate Date: