

**INDIAN INSTITUTE OF TECHNOLOGY MANDI**  
**KAMAND, DISTT. MANDI – 175005 (HIMACHAL PRADESH)**



**MINUTES OF 33<sup>RD</sup> BOARD OF ACADEMICS MEETING**

VENUE : A-4 CONFERENCE ROOM, KAMAND

DATE : 31<sup>ST</sup> JANUARY, 2020 (FRIDAY)

TIME : 03:00 P.M.

**Following members attended the meeting**

<b>Sl.No</b>	<b>Responsibilities</b>	<b>Name</b>
1	Dean Academics	Dr. Pradeep Parameswaran
2	Associate Dean (Research)	Dr. Rahul Vaish
3	Associate Dean (Courses)	Dr. Anil K Sao
4	Chairman Library Advisory Committee	Dr. Astrid Kiehn
5	Chairman Course Proposal Committee	Dr. Kunal Ghosh
6	Course Coordinator (B.Tech.-EE)	Dr. Rahul Shrestha
7	Course Coordinator (B.Tech.-CE)	Dr. Maheshreddy Gade
8	Course Coordinator (B.Tech.-DSE)	Dr. Manoj Thakur
9	Course Coordinator (B.Tech.-EP)	Dr. Pradeep Kumar
10	Course Coordinator (M.Tech.-(Structural Engg.))	Dr. Sandip Kumar Saha
11	Course Coordinator (M.Tech.-(Communication and Signal Processing))	Dr. Samar Agnihotri
12	Course Coordinator (M.Tech.-(Power Electronics and Drives))	Dr. Narsa Reddy Tummuru
13	Course Coordinator (M.Tech.-Biotechnology)	Dr. Shyam K Masakapalli
14	Course Coordinator M.Sc. (Chemistry)	Dr. Chayan K Nandi
15	Course Coordinator (M.Sc.-Applied Mathematics)	Dr. Rajendra K Ray
16	Course Coordinator (M.Sc.-Physics) + (I-Ph.D. (Physics))	Dr. Ajay Soni
17	Nominee-1: School of Basic Sciences	Dr. Nitu Kumari
18	Nominee-1: School of Humanities & Social Sciences	Dr. Devika Sethi
19	Assistant Registrar (Academics): Secretary	Mr. Vivek Tiwari

**Following members could not attend the meeting**

<b>Sl.No.</b>		<b>Name</b>	
1	Course Coordinator (IC Courses)	Dr. Aniruddha Chakraborty	Member
2	Course Coordinator (HSS Courses)	Dr. Suman Sigroha	Member
3	Course Coordinator (B.Tech.-CSE)	Dr. Dileep A D	Member
4	Course Coordinator (B.Tech.-ME)	Dr. Gaurav Bhutani	Member
5	Course Coordinator (B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engg.)	Dr. Shubhajit Roy Chowdhury	Member
6	Course Coordinator (M.Tech.- (Energy Engg. (Materials))	Dr. Sumit Sinha Ray	Member
7	Course Coordinator (M.Tech.-(Mechanical Engg. (Energy Systems))	Dr. Pradeep Kumar	Member
8	Course Coordinator (M.Tech.-(VLSI))	Dr. Hitesh Shrimali	Member
9	Course Coordinator (MA Dev. Studies)	Dr. Shyamasree Dasgupta	Member
10	Nominee-1: School of Engineering	Dr. Gaurav Bhutani	Member
11	Nominee-2: School of Engineering	Dr. Subhamoy Sen	Member
12	Nominee-1: School of Computing & Electrical Engineering	Dr. Srkant Srinivasan	Member
13	Nominee-2: School of Computing & Electrical Engineering	Dr. Manas Thakur	Member
14	Nominee-2: School of Basic Sciences	Dr. C.S.Yadav	Member
15	Nominee-2: School of Humanities & Social Sciences	Dr. Puran Singh	Member
16	Industry Member – 1	Dr. Nadeem Akhtar	Member
17	Research Affairs Secretary	Mr. Partha S. Nayak	Member
18	Academic Affairs Secretary	Mr. Anand Ramrakhiani	Member

**Special Invitee**

<b>Sl.No.</b>	<b>Name</b>	
1.	Dr. Renu M Rameshan	Asst. Prof., SCEE
2.	Dr. Trayambak Basak	Asst. Prof., SBS
3.	Dr. Rajesh Ghosh	Asst. Prof., SE

## PART-A

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

At the outset of the meeting, the Chairman, BoA extended his thanks to the outgoing members for their contribution and welcomed the new members to the BoA.

#### **33.1 Confirmation of the minutes of 32<sup>nd</sup> meeting of Board of Academics:**

The minutes of the 32<sup>nd</sup> Board of Academics meeting held on 5<sup>th</sup> December, 2019 were confirmed.

#### **33.2 To consider approval of courses presented by the Course Proposal Committee (CPC):**

The Chairperson, Course Proposal Committee (CPC) presented thirteen courses for consideration and approval of the BoA. After due deliberations, the BoA recommended eleven courses with minor modifications for consideration of the Senate and its approval, which is placed as **Annexure - A**.

Sl.No	Course No.	Course Name	Credits
1	CE 612	Theory of Plates and Shells	3-0-0-3
2	ME 513	Finite Element Methods in Engineering	3-0-2-4
3	HS 554P	Post Graduate Project	0-0-35-23
4	EE 536	IoT Systems	2-0-2-3
5	EE 530	Applied Optimization	3-0-0-3
6	EE 620	Advanced Digital Signal Processing	3-0-0-3
7	EE 535	Systems Design	0-0-4-2
8	IC 230	Environmental Sciences	3-0-0-3
9	BY 517	Proteomics	3-0-0-3
10	CY 555	Introduction to Polymer Science & Technology	3-0-0-3
11	CS 502	Compiler Design	3-0-2-4

The following two courses were deferred by the BoA.

Sl.No.	Course No.	Course Name	Credits
1	IC 111	Engineering Mathematics II	2.5-0.5-0-3
2	CS 563	Scalable Data Science	3-1-0-4

### 32.3 Any other item with the permission of the Chair.

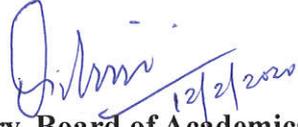
In addition to the circulated agenda points, with the permission of Chairman, BoA considered the following item:

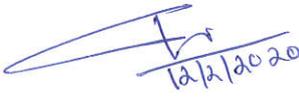
Dr. Rahul Vaish, Associate Dean (Research) presented a proposal to implement a fixed amount for International conference visits of Ph.D. scholars in their Ph.D. tenure. Currently, institute reimburses the expenditure incurred for such visits without keeping any specific upper cap. While implementing this policy, the following observations have been made:

- (1) The amount that students claim vary depending on the country they visit, early booking of tickets/hotels etc.
- (2) Often requests are received for allowing this funding for international visits other-than conference visits. Such visits may be for visiting collaborator, taking up a prestigious fellowship, attending training programs, summer or winter schools etc.
- (3) Requests are also received for reimbursement of ticket cancellation fee, viza fee etc. in cases where the travel was cancelled under unavoidable circumstances.
- (4) Currently, there is an upper limit for registration fee (*maximum upto US\$-500*), that can be paid from institute support. For many conferences, registration fee is higher than the institute limit.

Considering the above points, a need is felt for having a more flexible policy of funding International Visits. Accordingly, it is proposed to have a fixed amount admissible for each Ph.D. student for international visits, which can be used for covering the cases mentioned in point No. 2 to 4 above as well. If the support amount from institute is fixed, students can plan single or multiple trips within that amount with additional support from other sources if required. The amount will be proposed in Senate based on actual expenditure data over the last year.

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

  
Secretary, Board of Academics

  
Chairman, Board of Academics

**IIT Mandi**  
**Proposal for a New course**

**Course Number:** CE-612

**Course Name:** Theory of Plates and Shells

**Credits:** 3-0-0-3

**Prerequisites:** Theory of Elasticity, Advance Solid Mechanics (CE 557, ME 606 or equivalent)

**Intended for:** M.Tech./M.S./Ph.D./ B. Tech (3<sup>rd</sup> and 4<sup>th</sup> Year)

**Distribution:** Elective

**Semester:** Odd/Even

**1. Preamble:** This course is an advanced course in theory of elasticity and is equally important for the postgraduate students in Civil, Mechanical and Aerospace engineering as well as for practicing engineers to understand the behavior of thin/thick curved structural members under applied loads. The course starts with the introduction to the plate bending theory, assumptions and its applications to the different fields of engineering. Later on, the concept of curvature is introduced to study the behavior of shells.

**2. Modules with Quantitative hours:**

1. Introduction to classical plate theory and governing equations, stress resultants, boundary conditions. (6)
2. Solution of bending of rectangular plates using Navier and Levy methods. (4)
3. Bending of circular plates. (4)
4. Vibration and buckling of rectangular and circular plates. (4)
5. Introduction to surfaces, Strain displacement relations in curvilinear coordinates, Classification of shells. (6)
6. Membrane theory of shells and governing equations, stress resultants, boundary conditions. (6)
7. Analysis of axisymmetric shells. (4)
8. Bending, buckling and vibration of circular cylindrical shells. (8)

**3. Textbooks:**

- a. S.P. Timoshenko and S. Woinowsky-Krieger, "Theory of Plates and Shells", 2<sup>nd</sup> Ed., McGraw Hill, Singapore (2010).
- b. W. Soedel, "Vibrations of Shells and Plates", Marcel Dekker, New York (2004).
- c. D.O. Brush and B.O. Almorth, "Buckling of Bars, Plates and Shells", McGraw Hill, New York (1975).

**4. References:**

- 1) H. Kraus, "Thin Elastic Shells", John Wiley and Son, New York (1967).
- 2) E. Ventsel and T. Krauthammer, "Thin Plates and Shells Theory, Analysis, and Applications" Marcel Dekker, Inc, New York, Basel (2001).
- 3) K. Chandrashekhara, "Theory of Plates" Universities Press (India) (2001).
- 4) J.N. Reddy, Theory and Analysis of Elastic Plates and Shells. Taylor & Francis Inc, CRC Press Inc (2006).

**5. Similarity Contents Declaration with Existing Courses:**

Sr. No.	Course code	Similarity Contents	Approx.% of Contents
NIL			

**6. Justification for new course proposal if cumulative similarity contents is >30%**

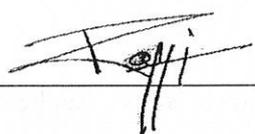
N.A.

**Approvals**

Another Faculty interested in teaching this course: Dr. M. Talha, Dr. Rajeev Kumar.

Proposed by: **Dr. Rajneesh Sharma and Prof. Tarun Kant**

School: **SE**

Signature  \_\_\_\_\_ Date: \_\_\_\_\_

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Recommended/Not Recommended, with Comments:

\_\_\_\_\_ Date: \_\_\_\_\_  
Chairman, CPC

*Approved / Not Approved*

\_\_\_\_\_ Date: \_\_\_\_\_  
Chairman, Senate

# IIT Mandi

## Proposal for a New Course

**Course Number: ME 513**

**Course Name: Finite Element Methods in Engineering**

**Credits: 3-0-2-4**

**Prerequisites: Linear Algebra (IC 111) or Equivalent Course; Mechanics of Rigid Body (IC 240) or Equivalent; Mechanics of Solids (ME 206)/Strength of Material (CE 301) or equivalent.**

**Intended for: BTech 3<sup>rd</sup> and 4<sup>th</sup> Year; M.Tech/MS/Ph.D.**

**Distribution: Discipline Core for M.Tech-Structural Engineering; Elective for BTech 3<sup>rd</sup> and 4<sup>th</sup> Year; MTech/MS/Ph.D.**

**Semester: Odd/Even**

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**1. Preamble:** To provide the basic concepts of finite element method and its applications to wide range of engineering problems. This course deals with various modelling techniques and uses different numerical methods for solving a system of governing equations over the domain of a continuous physical system (such as structural problem, thermal problem, fluid mechanics problem), which is discretized into simple geometric shapes called finite element.

### **2. Course Modules with Quantitative lecture hours:**

**Basic concept:** Introduction, Engineering applications of finite element method, Rayleigh- Ritz method, Weighted residual methods: Galerkin's method, Principle of a minimum potential energy, principle of virtual work, Boundary value problem, initial value and Eigenvalue problem, Gauss elimination method.

**[8 hours]**

**Basic procedure:** General description of Finite Element Method, Discretization process; types of elements 1D, 2D and 3D elements, size of the elements, location of nodes, node numbering scheme, half Bandwidth, Stiffness matrix of bar element by direct method, Properties of stiffness matrix, Pre-processing, post processing, One Dimensional Problems.

**[6 hours]**

**Interpolation models:** Polynomial form of interpolation functions- linear, quadratic and cubic, Simplex, Complex, Multiplex elements, Selection of the order of the interpolation polynomial, Convergence requirements, 2D Pascal triangle, Linear interpolation polynomials in terms of global coordinates of bar, triangular (2D simplex) elements, Linear interpolation polynomials in terms of local coordinates of bar, triangular (2D simplex) elements, CST element.  
**[6 Hours]**

**Higher order and isoparametric elements:** Lagrangian interpolation, Higher order one dimensional elements- quadratic, Cubic element and their shape functions, properties of shape functions, Truss element, Shape functions of 2D quadratic triangular element in natural coordinates, 2D quadrilateral element shape functions – linear, quadratic, Biquadric rectangular element (Noded quadrilateral element), Shape function of beam element. Hermite shape functions of beam element. **[6 hours]**

**Derivation of element stiffness matrices and load vectors:** for bar element under axial loading, trusses, beam element with concentrated and distributed loads, matrices, Jacobian, Jacobian of 2D triangular element, quadrilateral, Consistent load vector, Numerical integration. **[4 hours]**

**Heat transfer and Fluid mechanics problems:** 1D analysis for both heat transfer and fluid mechanics problem, heat conduction governing equation, boundary conditions, Galerkin approach, heat flux boundary condition, 1D heat transfer in thin fins. **[4 hours]**

**Elasticity problems:** Review of equations of elasticity, stress-strain and strain displacement relations, plane stress and plane strain problems. **[4 hours]**

**Dynamic problems:** Beam and Bar vibration; Natural frequency determination. **[4 hours]**

**Laboratory Component:** **[28 hours]**

- Coding for the complete solution of any suitable problem, Such as Bar, Truss and Beam. **[12 hours]**
- Introduction to ANSYS & ABAQUS. **[4 hours]**
- Bar and truss problem and 2-D analysis (assuming plane stress and plane strain). **[4 hours]**
- Introduction to OPEN SOURCE PROGRAMS (like OpenSees, FEAP, Elmer etc.) **[2 hours]**
- Some complex analysis using ANSYS or ABAQUS (complex material modelling or geometrical modelling). **[6 hours]**

### 3. Text book:

- Hutton, D.V., "Fundamentals of Finite Element Analysis", TMH, 2005.
- Logan, D. L., "A first course in the Finite Element Method", 6th edition, Cengage Learning, 2017.
- Fish, J. and Belytschko, T., "A first course in Finite Elements", Wiley 2007.

### 4. References:

- Rao, S.S. "The finite element method in engineering", 4th edition, Elsevier, 2005.
- Reddy, J.N., "An introduction to the finite element method", McGraw-Hill, 2005.
- Huebner, K. H., Dewhirst, D. L., Smith, D. E. and Byrom, T. G., "The finite element method for engineers", 4th edition, John Wiley & Sons, 2001.

- Chandrupatla, T.R., "Finite element analysis for engineering and technology", University Press (India) Pvt Ltd, 2004.

**5. Similarity Content Declaration with Existing Courses:**

S.N	Course Code	Similarity Content	Approx. % of Content
1	ME 206	Plane stress and plane strain	2%

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

**Approvals:**

Other Faculty interested in teaching this course: Dr. Kaustav Sarkar, Dr. Arpan Gupta, Dr. Sandip Saha, Dr. Rajneesh Sharma, Dr. Rajeev Kumar, Dr. Md. Talha.

Proposed by: Dr. Rajesh Ghosh

School: SE

Signature: 

Date: 10/02/2020

Recommended/Not Recommended, with Comments:

\_\_\_\_\_  
Chairman, CPC

Date: \_\_\_\_\_

*Approved / Not Approved*

\_\_\_\_\_  
Chairman, Senate

Date: \_\_\_\_\_

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS554P
<b>Course Name</b>	: Post Graduate Project
<b>Credits</b>	: 0-0-46-23
<b>Prerequisites</b>	: None
<b>Intended for</b>	: MA in Development Studies
<b>Distribution</b>	: Discipline Core for M.A. in Development Studies in the 4 <sup>th</sup> Sem
<b>Semester</b>	: Even/Odd

**1. Preamble:**

During the 4<sup>th</sup> Semester of the MA programme in Development Studies, a student has to choose between two modes of PGP: either working on a research topic leading to a dissertation at IIT Mandi (Mode 1) or doing a guided internship with an appropriate agency and submitting appropriate reports based on the same (Mode 2). In the first case the student stays at IIT Mandi and completes the research project and in the other case the student attaches him/herself to an organization outside the Institute.

While a dissertation will be more appropriate for a student aiming to pursue an academic career, guided internship will be a more useful research component for students aiming to join inter-governmental/non-governmental organizations right after the M.A. programme and pursue their career as development practitioners.

**2. Course Modules:**

**Mode 1:** Each student is assigned to a faculty supervisor and carries out a short research project under the his/her supervision at IIT Mandi. Faculty will float the topics related to development challenges. A student interested in working on any particular topic may consult the faculty and the faculty may float the topic accordingly.

**Mode 2:** Each student has to come up with a proposal for guided internship with a suitable organization/institute. The internship will be performed at that organization/institute itself. The proposal has to include the name of the organization/institute, nature of work to be carried out, area of work and the duration of work. The duration of the internship has to be no less than 12 weeks and the student has to report back to IIT Mandi at least 2 weeks before the end of the

semester. There has to be one faculty member from IIT Mandi who will supervise the internship jointly with the supervisor at the organization/institute where the internship is carried out.

**Evaluation:**

In both modes evaluation will be done by the same examination committee along with the project supervisor at IIT Mandi to ensure consistency. In the case of guided internship, the faculty supervisor at IIT Mandi will be consulting with the organization/institute of internship. External experts can be invited, if required. Deliverables for both modes will be the same: mid-term report, open house presentation and final report.

**3. Textbook**

Will be suggested by the faculty mentor as per requirement of the student.

**4. References:**

Will be suggested by the faculty mentor as per requirement of the student.

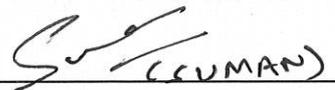
**5. Similarity Content Declaration with Existing Courses: None**

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

**Approvals:**

**Proposed by:** NA **School:** SHSS

**Other Faculty interested in teaching this course:**

**Signature:**  (SUMAN)

**Date:** 11/02/2020

**Recommended/Not Recommended, with Comments:**

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**Date:** \_\_\_\_\_

**Chairman, CPC**

*Approved/Not Approved*

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**Date:** \_\_\_\_\_

**Chairman, Senate**

# Proposal for a new course

*Course Name:* IoT Systems

*Course Number:* EE536

*Credits:* 2-0-2-3

*Prerequisites:* Communication theory; Computer networks; Microcontroller programming and Digital systems design or equivalent courses or approval of the instructor

*Intended for:* B.Tech. 3<sup>rd</sup> and 4<sup>th</sup> year/ MS/M.Tech (CSP/VLSI/PED)/PhD

*Distribution:* Core for M.Tech. (CSP) and elective other M. Tech; elective for B.Tech. 3<sup>rd</sup> and 4<sup>th</sup> year, elective for M.S and Ph.D.

*Semester:* Even

**Preamble:** The Internet of things can be seen as an agglomeration of various technologies that facilitate data acquisition, device-to-device communication, real-time monitoring and actuation for several real-world applications. The objective of this course is to introduce the students to some of these constituent technologies and provide them hands-on experience in designing small-scale IoT systems. While the emphasis is given on the implementation aspects, the students will be briefed about the underlying theoretical concepts. They will be also introduced to several performance metrics that can be used to evaluate different IoT systems.

**Learning outcome:** After taking this course, students will

1. be familiar with different prototyping boards and their components. They will be able to choose an appropriate board/components for designing an IoT system.
2. have hands-on experience in programming off-the-shelf boards using respective IDEs. Additionally, they will be able to choose appropriate libraries for interfacing with external sensors, or communication modules.
3. be versed in different communication standards and technologies. They will be able to choose appropriate communication technology/technologies for designing an IoT system.
4. be knowledgeable about Medium Access Protocols, routing algorithms and their implementations.
5. be able to compare different IoT systems in terms of different performance metrics: network lifetime, power consumption, reliability of the network etc.
6. be able to design a small-scale IoT system for several real-world applications.

**Course modules:**

1. *A quick introduction to IoT systems:* (1 lecture hour)  
Predecessors of IoT: Wireless Sensor Networks; SCADA, Industrial automation;

Driving forces of IoT: BigData, AI; Next Generation IoT and Internet of Everything

2. *Hardware components of IoT systems:* (2 lecture hours + 2 lab hours)  
A quick overview of different components---micro-controllers, SoCs, communication modules, power supply and sensing modules---of off-the-shelf prototyping boards, e.g., Arduino UNO, MSP430 LaunchPad; NodeMCU, STM32, Raspberry Pi.
3. *Software component of IoT systems:* (6 lecture hours + 6 lab hours)  
Introduction to IDEs for off-the-shelf boards, e.g., Arduino IDE, Waspote IDE, Code composed studio; Contiki-OS and RIOT OS; 6LowPAN network stack; Sensor interfacing; GPIO programming
4. *Communication paradigm of IoT systems:* (12 lecture hours + 12 lab hours)  
Different wireless standards, e.g., IEEE802.15.4, ZigBee, BLE, IEEE802.11; link layer technologies, Medium Access Control; Routing; Application layer protocols; Network topologies.
5. *Performance evaluation of IoT systems:* (4 lecture hours + 4 lab hours)  
Developing mathematical models for energy consumption, Optimal node placement, resource allocation over wireless sensor networks to meet QoS requirements.
6. *Case studies/mini projects:* (3 lecture hours + 4 lab hours)  
Home automation; Building energy management; Indoor positioning; Air quality monitoring; Precision agriculture; Smart parking

#### **Textbooks:**

1. David Hanes *et al.*, *IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things*, First edition, Pearson, 2017

#### **Reference Books:**

1. Parry Lea, *Internet of Things for Architects: Architecting IoT Solutions by Implementing Sensors, Communication Infrastructure, Edge Computing, Analytics, and Security*, Packt Publishing Limited, 2018
2. Shuang-Hua Yang, *Wireless Sensor Networks: Principles, Design and Applications*, Springer.
3. Kazem Sohraby, Daniel Minoli, Taieb F. Znati, *Wireless Sensor Networks: Technology, Protocols, and Applications*, Wiley Interscience, 2009
4. White papers, RFCs, survey articles on Wireless communication standards and technologies.
5. Antonio Linan Colina, Alvaro Vives, Antoine Bagula, Marco Zennaro and Ermanno

Pietrosemoli, *IoT in five Days*, <https://github.com/marcozennaro/IPv6-WSN-book/releases/>

**Similarity Content Declaration with Existing Courses:**

Sr #	Course code	Similarity content	Approx. % of content
1	Embedded Systems (EE529)	Sensor control using Micro controllers	10%
2	IoT systems and Cloud (CS541P)	Microcontroller programming, device-to-device communication, wireless technologies (this is a practicum course)	10%

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

**Approvals:**

Other Faculty who may be interested in teaching this course:

**Proposed by** Siddhartha Sarma

School: SCEE

**Signature:** \_\_\_\_\_

Date \_\_\_\_\_

Recommended/Not Recommended, with Comments:

\_\_\_\_\_ Date: \_\_\_\_\_

Chairman, CPC

*Approved / Not Approved*

\_\_\_\_\_ Date: \_\_\_\_\_

Chairman, Senate

## Proposal for Revising and Renaming EE530

Course Number : EE 530

Course Name : Applied Optimization

Credits : 3-0-0-3 (L-T-P-C)

Prerequisites : Linear algebra (MA512 or IC 111) or Matrix Theory (EE522).

Intended for : UG /MS/MTech (CSP)/PhD/M.Sc(Maths)

Distribution : Core for MTech (CSP), Elective for B.Tech. III/IV year, MS, Ph.D, M.Sc (Applied Mathematics).

Semester : Even

Comments: The course name and syllabus for EE 530 has been revised. The course name has been changed from Optimization theory to Applied Optimization. The revised syllabus is as mentioned below. The revision has been approved in 33<sup>rd</sup> BOA meeting dated 31<sup>st</sup> January, 2020.

### Preamble

This course is intended to be a core course for M.Tech Communication and Signal Processing students and elective for MS/Phd and senior B.Tech students. Many of the problems in communication as well as signal processing are solved using optimization. Many of these are nonconvex in nature. This course is focused on enabling students to solve convex optimization problems and also to handle nonconvexity.

After finishing this course the students should be in a position to (i) convert a given problem to an appropriate optimization problem (ii) analyze the problem and (iii) choose an appropriate algorithm to solve the problem.

Specific applications from communication and signal processing which uses the theory developed in the initial modules is included in the last module. For these, in addition to the theory the students are expected to implement these algorithms and analyze the solvability in some of the cases.

### Course modules with Quantitative lecture hours:

Convex analysis: convex sets, convex cones, polyhedral sets, extreme points and directions. Convex functions, properties and tests for convexity, operations that preserve convexity, conjugate function. **(6 hours)**

Convex optimization problems: standard form, equality and inequality constraints, slack variables, eliminating equality and inequality constraints. Local and global optima. Optimality criterion for unconstrained, equality constrained and inequality constrained problems. **(7 hours)**

Linear optimization problems with examples, linear and generalized linear-fractional programming. Quadratic problems with examples. Second order cone programming –

robust linear programming, linear programming with random constraints. Geometric programming with examples. Generalized inequality constraints – conics form problems, semidefinite programming, examples. **(14 hours)**

Handling non-convexity: Lagrangian duality theory – Lagrangian dual function, strong and weak duality, duality gap. Certificate of suboptimality and stopping criteria, complementary slackness. KKT optimality conditions. Solving the primal via dual. **(9 hours)**

Applications of convex programming in communication and signal processing: *The choice of applications is left to the faculty member handling the course.* Examples that could be used are: Optimal decentralized estimation (single and multisensor case). Pulse shaping filter design. Quasi-ML detection via SDP relaxation (or any other problems in CSP) **(6 hours)**

**Textbook:**

1. S. Boyd and L. Vandenberghe, Convex optimization, Cambridge University Press, 2008.

**Reference books:**

1. M.S. Bazaraa, H.D. Sherali and C.M. Shetty, Nonlinear Programming, 3/e, Wiley, 2006.
2. D. P. Bertsekas, Nonlinear programming, Athena Scientific, 1999.
3. D. G. Luenberger and Y. Ye, Linear and nonlinear programming, 3/e, Springer, 2008.
4. Relevant literature.

**Similarity Content Declaration with Existing Courses:**

Sr No	Course code and title	Similarity content	Approx % of content	Remarks
1.	MA 515, Applied Mathematical Programming	Linear programming, non linear programming	10%	Minor overlap.
2.	MA 651 Optimization Techniques	Convexity, duality, unconstrained optimization algorithms	15%	Overlap of concepts.

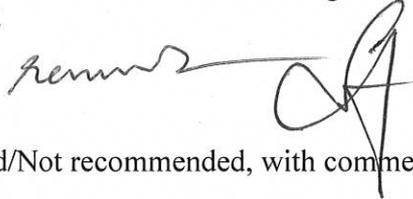
**Justification for new course proposal if cumulative similarity content is > 30%: NA**

**Approvals:**

Other faculty interested in teaching this course: Satyajit Thakor, Adarsh Patel.

Proposed by: Renu Rameshan, Samar Agnihotri, Siddhartha Sarma  
School: SCEE

Signature:



Date: 24 Oct 2019

Recommended/Not recommended, with comments

Chairperson, Course proposal committee (CPC)

Date:

Approved / Not Approved

Chairperson, Senate

Date:

## Proposal for Revising EE620 Advanced Digital Signal Processing

Course Number : EE 620

Course Name :Advanced Digital Signal Processing

Credits : 3-0-0-3 (L-T-P-C)

Prerequisites : Digital Signal Processing (EE305) or equivalent courses, Linear algebra (MA512 or IC 111)/Matrix Theory (EE522) or equivalent courses.

Intended for : UG /MS/MTech (CSP)/PhD/M.Sc (Applied Mathematics)

Distribution : Specialization course for MTech (CSP), Elective for B.Tech. EE III/IV year, MS, Ph.D.

Semester : Even/Odd

Comments: The syllabus for EE 620 has been revised. The revised syllabus as approved by 33<sup>rd</sup> BOA, held on 31<sup>st</sup> January 2020 is as mentioned below.

### Preamble

Digital signal processing has advanced quite a lot over the past few years branching out into multiple paths which differ in the underlying approach. This course is focused on the extension of Fourier methods and moves to time-frequency localization with an extensive coverage of wavelets and filter banks. Students are expected to have an undergraduate level expertise in continuous and discrete time Fourier analysis and exposure to digital filter design.

### Course modules with Quantitative lecture hours:

Review: Signal spaces:  $L_1(\mathbb{R}), L_2(\mathbb{R}), l_1(\mathbb{Z}), l_2(\mathbb{Z})$ . finite dimensional vector spaces. Filter design: FIR, IIR and all pass filter design. Biorthogonal basis. Bounded linear operators (on Hilbert spaces). Convergence and regularity of functions. **(9 hours)**

Multirate systems: decimation, interpolation, fractional sampling rate, digital filter bank, multirate filters, Noble identities. Polyphase representation, efficient structures for interpolation, decimation filters. **(7 hours)**

Haar and sinc expansion of discrete-time signals. Two channel filter banks – time, modulation and polyphase domain analysis and relation between the three representations. Perfect reconstruction and approximate reconstruction – alias-free reconstruction, QMF. Orthogonal FIR filter banks. Linear phase FIR filter banks. IIR filter banks. Tree-structured and multichannel filter banks, modulated filter banks – STFT and cosine modulated filter banks. **(10 hours)**

Series (Fourier and sinc) expansion of signals and their time frequency resolution. Haar expansion. Multiresolution analysis and construction of the wavelet. Construction of wavelets using Fourier techniques. Wavelets from iterated filter banks and regularity. Wavelet series. **(10 hours)**

Applications: *Choice of applications is left to the instructor.* Example: signal compression and subband coding. (6 hours)

**Textbook:**

1. Martin Vetterli and Jelena Kovacevic, Wavelets and Subband Coding, Prentice Hall PTR, 2007.

**Reference books:**

1. Vetterli M., Kovacevic J., Goyal V.K., Fourier and Wavelet Signal Processing, Cambridge University Press, 2013.
2. P.P. Vaidyanathan, Multirate Systems And Filter Banks, Prentice Hall, 1993.
3. Stephen Mallat, A Wavelet Tour of Signal Processing The Sparse Way, Elsevier 2009.

**Similarity Content Declaration with Existing Courses:**

Nil

**Justification for new course proposal if cumulative similarity content is > 30%: NA**

**Approvals:**

Other faculty interested in teaching this course:

Proposed by: Renu Rameshan

School: SCEE

Signature: 

Date: 2 Dec 2019

Recommended/Not recommended, with comments

Chairperson, Course proposal committee (CPC)

Date:

Approved / Not Approved

Chairperson, Senate

Date:

# Proposal for a new course

*Course Name:* Systems Design

*Course Number:* EE535

*Credits:* 0-0-4-2 (L-T-P-C)

*Prerequisites:* None

*Intended for:* M.Tech. Communications and Signal Processing (CSP)

*Distribution:* Core for M.Tech. (CSP)

*Semester:* Winter Session of Year I

**Preamble:** The objective of this course is to provide hands-on experience in system design to the M.Tech. (CSP) students after completion of their first-semester course work. This course will not only help them in understanding the practical application of various core and elective courses, but also will prepare them for specializations they may plan to pursue.

The students are expected to deliver a product---a **hardware prototype**, a **well-designed software**, a **high-level design of a complex system** or, a **tested and verified algorithm**---at the end of the course. To ensure the engagement of each and every student, the projects are supposed to be done individually. Students are encouraged to pursue the same or similar projects as their dissertations.

**Course modules:** It is advisable that the projects should be related to the courses M.Tech.(CSP) students may credit or the specializations that this program offers. Therefore, students can opt for any project in Signal Processing, Communications or Machine Learning. Additionally, they are allowed to select a project from other areas, e.g., VLSI, Power electronics, Electrical drives or Control systems, as long as the project has **30% or more overlap** with any of the three specialization of M.Tech. (CSP) curriculum.

**Deliverables:** A student must declare the deliverables of her/his project in the initial project proposal after consulting with the respective mentor(s). While the initial project proposal and the final report carry some marks, a significant portion of the marks, **70% or more**, is allotted to the deliverables to emphasize their importance.

**Contact hours:** On average, a student should work 40 hours per week on her/his project. The students are supposed to meet their respective mentors at least once in a week to report their progress.

**Evaluation:** There will be two evaluations—one in the beginning of the winter vacation and the other one in the beginning of the forthcoming even semester. In the first evaluation, the

students will be graded based on the initial project proposals they have submitted. During the second evaluation, they will be evaluated based on their progress with respect to the promised deliverables, their project reports and the understanding they have gained from their respective projects.

**Textbooks: Related literature.**

**Similarity Content Declaration with Existing Courses: NA**

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

**Approvals:**

Other faculty members interested in teaching this course: This is a project-oriented course.

Proposed by: CIG-CSP School: SCEE

Signature:

Date:

Recommended/Not Recommended, with comments

Chairperson, Course proposal committee (CPC)

Date

# Proposal for a new course

## **Environmental Science (IC 230)**

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**Course Name:** Environmental Science

**Credits:** 3-0-0-3

**Prerequisites:** None

**Intended for:** UG

**Distribution:** IC

**Semester:** Odd / Even

**Preamble:** This course explores the natural environment and the dynamic biological, physical and chemical interactions that characterize it. Environmental issues faced by the modern world will be discussed. The role of humans in altering the natural biogeochemical cycles will be explored through focused discussions of topics such as natural resource exploitation (forestry, agriculture, mining, oil & gas, alternative energies), pollution (waste management, soil and water contamination, atmospheric pollution and climate change), and land use changes (e.g., urbanization).

**Pre-requisite:** None

### **Course Outline:**

1. **Environmental components and issues :** Definition and Scope, Atmosphere, Hydrosphere, Lithosphere, Biosphere, Global, Regional and Local Issues, Climate change, Acid Rain, Eutrophication, Ozone layer depletion, Spread of toxic chemicals **(8 hours)**
2. **Environmental systems:** Characteristics and properties, biogeochemical cycles of carbon, nitrogen, phosphorous and water, Biotic and abiotic environment, Producers, consumers and degraders, Population and biodiversity, Food chain and webs, Energy and carbon flow through the food chain, Anthropogenic influence on food chain **(6 hours)**
3. **Natural Resources:** Forests, Effects of deforestation, Energy resources, renewable and non-renewable energy, Mineral resources, Water resources **(6 hours)**
4. **Environmental Pollution:** Common pollutants and their spread, Air pollution, Water pollution, Soil pollution, Measurement of pollution, environmental parameters and standards **(8 hours)**

5. Impacts of Environmental Pollution: Environmental impact assessment, DPSIR Analysis, Life Cycle Analysis, Carbon Footprint Analysis (6 hours)
6. Environmental Management and Case studies: monitoring and measurement of pollution, reduction-reuse-recycling possibilities, Waste management and by-laws, Case-studies and field reports, Opportunities and challenges (8 hours)

**Textbooks:**

“Environmental Science”, G. Tyler Miller and Scott Spoolman, CENGAGE Learning Custom Publishing, Canada, 16th edition (2017)

**Reference Books:**

Lecture Notes provided by the course instructor

“A Text Book of Environmental Science”, Arvind Kumar, A P H Publishing Corporation, New Delhi, India (2008)

“Basics of Environmental Science”, Michael Alleby, 2<sup>nd</sup> Edition, Routledge - Taylor & Francis Group, New York, USA (2000)

**Proposed by:** Prof. Ajit P. Annachhatre

**School:** SE

Signature Ajit P. Annachhatre

Date 12 Feb 2020

**Recommended/Not Recommended, with Comments:**

\_\_\_\_\_  
Chairman, CPC

Date: \_\_\_\_\_

**Approved / Not Approved**

\_\_\_\_\_  
Chairman, Senate

Date: \_\_\_\_\_

# Proposal for a new course

**Course Name:** Proteomics

**Course Number:** BY 517

**Credit:** 3-0-0-3

**Prerequisites:** - IC 136 - Understanding Biotechnology & its Applications OR Consent of Faculty member

**Students intended for:** B. Tech. 3<sup>rd</sup> and 4<sup>th</sup> year, MS/MSc. /M.Tech., Ph.D.

**Elective or Core:** Elective

**Semester:** Even

**Comments:** The course content for BY 517 has been revised. The revised content as approved by 33<sup>rd</sup> BOA held on 31<sup>st</sup> January, 2020 is as mentioned below.

**Course objective:** This course will introduce the concepts of Proteomics – its principles and techniques which play a significant role in modern systems biology and related areas. Proteomics deals with the qualitative and quantitative analysis of the entire protein complement of any cell/tissue/organ/species/biological system expressed in a specific time and space. This course introduces the basics of evolution of proteomics as an area, the experimental aspects of tools and techniques in addressing systems level applications. As a result of this course, the students will have strong foundations and first hand scientific understanding of current state-of-the-art trends in Mass Spectrometry based Proteomics and its applications.

**Course Outline:** Approval: 10<sup>th</sup> Senate meeting

Module 1: An introduction to proteomics: Basics of protein structure and function, An overview of systems biology, Evolution from protein chemistry to proteomics (6 hours)

Module 2: Abundance-based proteomics: Sample preparation and prefractionation steps, Gel-based proteomics - two-dimensional gel electrophoresis (2-DE), Two-dimensional fluorescence difference in-gel electrophoresis (DIGE), Principles of Blue Native-PAGE, Staining techniques, Fundamentals of liquid-chromatography (LC) based protein and peptide separation methods.

(6 hours)

Module 3: Central role of mass spectrometry: Different types of mass spectrometers with respect to source ionization and design, Different kinds of mass analyzers, Different mode of data acquisition; Concepts of top-down vs bottom-up approaches and targeted vs untargeted approaches in proteomics. **(6 hours)**

Module 4: Quantitative proteomics - stable isotope labeling by amino acids in cell culture (SILAC), Isotope-coded affinity tag (ICAT), Isobaric tagging based methods for quantitative proteome analyses (iTRAQ/TMT), Label free quantitation (LFQ) (MS based, data-independent acquisition-DIA etc.), Targeted approaches (SRM,MRM). Challenges in performing proteomics in biofluids such as plasma, serum etc. (clinical proteomics). **(6 hours)**

Module 5: Functional proteomics: Recombinational cloning, Protein-protein interaction techniques by yeast two-hybrid, immunoprecipitation, protein microarrays, Nucleic Acid Programmable Protein Array (NAPPA), Surface Plasmon Resonance (SPR); Understanding post-translational modifications (PTMs) mainly phosphorylation and glycosylation. **(6 hours)**

Module 6: Structural proteomics; Protein cross-link detection methods using mass spectrometry. **(6 hours)**

Module 7: Bioinformatics in proteomics; Manual interpretation of typical mass spectra, Mass spectrometry big data analyses using open-source software suits; Challenges and future prospects of proteomics research. **(6 hours)**

### **Text book**

Introducing Proteomics: From Concepts to Sample Separation, Mass Spectrometry and Data Analysis, J. Lovric, John-Wiley & Sons, Hoboken, New Jersey, USA; 2011. ISBN: 978-0-470-03524-5, ISBN: 978-1-119-95719-5 (eBook).

Lehninger Principles of Biochemistry (Seventh Edition), David L. Nelson, Michael M. Cox. Macmillan learning, 2017, ISBN:9781464187957 (eBook)

### **Other reference books**

Introduction to Proteomics: Tools for the New Biology, D.C. Liebler, Humana Press, 2002. ISBN 978-1-59259-130-5

Proteomics for Biological Discovery, T.D. Veenstra, J.R. Yates III, John-Wiley & Sons, Hoboken, New Jersey, USA; 2006. ISBN 978-0-471-16005-2

Proteomics: A Cold Spring Harbor Laboratory Course Manual, A.J. Link and J. LaBaer, Cold Spring Harbor Laboratory Press, 2009 ISBN 978-087969787-7

Introduction to Proteomics: Principles and Applications, N.C. Mishra, John-Wiley & Sons, Hoboken, New Jersey, USA; 2010. ISBN:9780471754022 (print), ISBN:9780470603871, DOI:10.1002/9780470603871.

Mass Spectrometry Data Analysis in Proteomics, R. Matthiesen, Humana Press, 2020. ISBN 978-1-4939-9743-5, ISBN 978-1-4939-9744-2 (eBook), DOI:10.1007/978-1-4939-9744-2.

Recent research articles will be advised accordingly.



## **IIT Mandi**

### **Proposal for a New Course**

**Course Name:** Introduction to Polymer Science & Technology

**Course Number:** CY 555

**Credits:** 3-0-0-3

**Prerequisites:** None

**Intended for:** UG/PG

**Distribution:** Elective for B.Tech. (all Branches), M.Tech./M.Sc. (Chemistry & all branches), & Ph.D. students

**Semester:** Odd/Even

***Preamble:***

The course forms an elective course for the M.Sc. (Chemistry) degree program. The existing core courses in this program include chemical kinetics while the other elective courses in this basket include synthesis and characterization of nanomaterials for interdisciplinary applications. This course will give a preview on designing polymer based materials. It will discuss polymers at various fronts: polymer properties, polymerization methods, kinetics of polymerization, polymer functionalization, characterization, processing, and designing polymer based advanced materials. Thus, this course will facilitate the students to develop critical thinking towards how the structure and properties of polymers can be tailored which is one of the most important prerequisites for developing new materials for desired applications. This course will provide the students an appreciation of the versatility which is inherent in polymerization processes and which is available to the polymer technologist in conjunction with other core and elective courses in the M.Sc. program.

***Outline:***

The course is designed to impart knowledge on a range of aspects of polymer science and technology starting from the fundamental science to practical applications. Students will learn about the advancement in the synthesis and characterization techniques. This course will also provide the students an understanding and knowledge of designing polymer based materials for advanced applications.

***Modules:***

- Module 1: Introduction to polymers **(6 hours)**  
History and recent developments, monomers, oligomers, polymers and their characteristics, classification and nomenclature of polymers, physical state of polymers, T<sub>g</sub>, T<sub>c</sub>, molecular weight and MWD, natural polymers
- Module 2: Radical polymerization **(6 hours)**  
Mechanism, kinetics, chain transfer, autoacceleration, gel effect, copolymerization, reactivity ratios, composition of copolymers, living radical polymerization: ATRP and RAFT
- Module 3: Ionic polymerization **(5 hours)**  
Mechanism and kinetics of cationic and anionic polymerization
- Module 4: Stereospecific polymerization **(2 hours)**  
Stereoisomerism, complex catalyst polymerization
- Module 5: Step growth polymerization **(6 hours)**  
Kinetics, step copolymerization, detailed methods for the preparation of polyesters, polyamides, polycarbonates etc., high performance polymers
- Module 6: Techniques of polymerization **(3 hours)**  
Bulk, solution, emulsion, suspension, melt polycondensation, solution polycondensation, interfacial and gas phase
- Module 7: Polymer characterization **(8 hours)**  
Molecular weight by GPC, light scattering, osmotic pressure etc., IR, UV, NMR, TGA, DSC, radiation scattering: SAXS, WAXS, DLS
- Module 8: Processing, testing and applications of polymer materials **(6 hours)**

Extrusion, molding, tensile, impact, flexural testing, adhesives, foam, polymer fibers, catalysis, environment care, medicine etc.

***Text Books:***

1. V. R. Gowarikar, N. V. Viswanathan, J. Sreedhar, Polymer Science, New Age International. Wiley, 3<sup>rd</sup> Edition, 2019.
2. F. W. Billmeyer, Textbook of Polymer Science, Wiley, 3<sup>rd</sup> Edition, 2007.

***Reference Books:***

1. G. Odian, Principles of polymerization, 4<sup>th</sup> Edition, Wiley, 2004.
2. P. C. Heimenz, T. P. Lodge, Polymer Chemistry, 2<sup>nd</sup> Edition, CRC press, 2007.
3. C. E. Carraher, Seymour/Carraher's Polymer Chemistry, 6<sup>th</sup> Edition, Marcel Dekker, Inc., 2003.
4. J. M. G. Cowie, Polymers: Chemistry and Physics of Modern Materials, 3<sup>rd</sup> Edition, CRC Press, 2007.
5. H. F. Mark, Encyclopedia of Polymer Science and Technology, 3<sup>rd</sup> Edition, Wiley, 2004.

***Approvals:***

Other Faculty interested in teaching this course:

Proposed by: Dr. Garima Agrawal

School: SBS

Signature Garima Date \_\_\_\_\_

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Recommended/Not Recommended, with Comments:

\_\_\_\_\_  
Chairman, CPC

Date:

*Approved / Not Approved*

\_\_\_\_\_  
Chairman, Senate

# IIT Mandi

## Proposal for a New Course

<b>Course number</b>	: CS502
<b>Course Name</b>	: Compiler Design
<b>Credit</b>	: 3-0-2-4
<b>Prerequisites</b>	: CS202: Data Structures and Algorithms or equivalent; CS304: Formal Languages and Automata Theory or equivalent
<b>Intended for</b>	: BTech third and final year CSE and MS/PhD
<b>Distribution</b>	: Elective for third and final year BTech CSE/EE, MS, PhD
<b>Semester</b>	: Odd/Even

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### 1. Preamble:

A compiler is a fundamental software necessary to translate computer programs to a form that can be executed on intended machines. Designing a compiler involves learning several aspects of computer science: logic, formalism, mathematics, data structures, algorithms, programming, and so on. This course is intended as a primer to the various stages typical in the design of standard compilers, starting with the front-end stages of compilation, and giving a peek into the back-end and some recent advancements in the area. At the end of the course, students should be able to appreciate the underlying concepts in compiler design, and be motivated to learn the art of analyzing and transforming programs for performance.

### 2. Learning outcomes:

After taking this course, the students will:

- be familiar with the front-end as well as back-end stages of compiler design
- understand the differences between constructing lexers/parsers by hand versus using automated generators
- get hands-on experience with generating intermediate representations, which in turn will let them appreciate the importance of designing simpler languages
- be able to appreciate the nuances of analyzing and transforming programs for performance
- get experience of working with relatively large programming environments, which will also inculcate a sense of good software design
- be motivated to explore different real-world applications that involve the concepts learnt as part of the course

### 3. Course modules:

- *Introduction and lexical analysis*: Introduction to language translators. Stages of compilation. Lexical analyzers: token specification and recognition. **[4 lecture hours]**
- *Parsing*: Overview of context-free grammars. Parse trees and derivations. Left recursion and left factoring. Top-down and bottom-up parsing. **[8 lecture hours]**
- *Semantic analysis*: Syntax-directed translation. Various intermediate representations. Intermediate code generation. Type checking. **[9 lecture hours]**
- *Runtime environments*: Activation records. Heap management. Garbage collection. **[4 lecture hours]**

- *Code generation and optimization*: Register allocation. Instruction selection and scheduling. Control-flow graphs. Data-flow analysis. Peephole optimizations. **[9 lecture hours]**
- *Advanced topics*: Loop optimizations. Call-graph construction. Machine learning in compiler design. Just-in-time compilers. **[8 lecture hours]**

#### 4. Labs:

Learning the art of compiler design involves a nice mix of theory and practice. The course consists of at least four programming assignments from the following set (assignments will be rotated in every offering to contain plagiarism):

- Learning to using a lexer/parser generator such as Flex/Bison/JavaCC
- Intermediate code generation
- Type checking
- One forward/backward dataflow analysis
- Register allocation
- Assembly code generation

Towards this end, the students will learn various new software and program analysis tools. The labs will be conducted to train the students in using these tools, and preparing them for the main take-home assignment by asking them to solve related simpler tasks in two-hour sessions. The lab slots may also be used sometimes to conduct tutorials.

#### 5. Textbooks:

1. Alfred V. Aho, Monica Lam, Ravi Sethi and Jeffrey D. Ullman. "Compilers: Principles, Techniques, and Tools", Second Edition, Pearson Education, 2007.
2. Andrew W. Appel, Jens Palsberg. "Modern Compiler Implementation in Java", Second Edition, Cambridge University Press, 2002.

#### 4. Reference books:

1. Keith D. Cooper and Linda Torczon. "Engineering a Compiler", Second Edition, Morgan Kaufmann, 2011.
2. Y. N. Srikant and Priti Shankar. "The Compiler Design Handbook", Second Edition, CRC Press, 2007.

**5. Similarity Content declaration with existing courses: Nil**

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

#### 7. Updates based on comments from reviewers:

1. Prof. Uday Khedker (IIT Bombay)

- *I hope some instruction selection algorithm (a simplistic tree pattern matching if not Aho-Ullman algorithm) will be included although it has not been mentioned (instruction scheduling is mentioned).*

Yes, instruction selection will indeed be covered; added it explicitly.

2. Dr. V. Krishna Nandivada (IIT Madras)

- *Using a lexer/parser generator — can be more specific.*

Changed it to “Learning to using a lexer/parser generator such as Flex/Bison/JavaCC”.

- *One dataflow analysis - forward dataflow analysis, I guess?*

I plan to teach both forward and backward dataflow analysis, and hence either could be given as an assignment; changed the topic to “One forward/backward dataflow analysis”.

- *In the text books: The dragon book has a 2013 paper back edition. May be the year can change. Similarly the second reference book seems to have a more later edition.*

Checked that the mentioned versions are reprints, not new editions, hence left unchanged.

**Approvals:**

Other Faculty who may be interested in teaching this course:

**Proposed by** Manas Thakur

School: SCEE

**Signature:** 

Date 12.02.2020

Recommended/Not Recommended, with Comments:

\_\_\_\_\_ Date: \_\_\_\_\_

Chairman, CPC

*Approved / Not Approved*

\_\_\_\_\_ Date: \_\_\_\_\_

Chairman, Senate