

Memorandum of Understanding

Between

University of Detroit Mercy

4001 West McNichols Road, Detroit, Michigan, 48221-3038, United States

And

Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology

400 Feet Outer Ring Road, Avadi, Chennai – 600 062, Tamil Nadu, India

Purpose

In order to establish academic cooperation and exchanges, University of Detroit Mercy (hereafter, **Detroit Mercy**) and Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology Vel Tech(hereafter, **Vel Tech**) hereby enter into agreements in regards to the following:

Article I – Graduate Admissions to University of Detroit Mercy

Detroit Mercy will issue letters of acceptance and other immigration documents in accordance with Detroit Mercy's admission requirements for graduate students. In the graduate admissions process, Detroit Mercy will consider recommendations from Vel Tech regarding their graduates. Degree candidates from Vel Tech are responsible for all tuition, room, and board, and other related expenses while pursuing a graduate degree at Detroit Mercy. Vel Tech graduates enrolling at Detroit Mercy will pay graduate tuition at a rate of \$1150 per credit.

To be accepted into any of the above programs, candidates from Vel Tech must have successfully completed a four-year undergraduate degree program at Vel Tech or a three or four-year degree from a university recognized by Detroit Mercy. They must also demonstrate evidence of English proficiency. To do so, they may submit either a TOEFL score of 81 (iBT) or its equivalent (e.g., IELTS = 6.5). Applicants needing additional or remedial work in English may be enrolled in intensive English language coursework.

Article II - Gateway Program (4+1 Program)

Detroit Mercy authorizes Vel Tech to offer 6 credits of Detroit Mercy approved graduate-level courses to be transferred for students who are strongly interested in and inclined to apply for graduate admissions at Detroit Mercy. The courses will be taught by an experienced faculty member from Vel Tech (or designated by Vel Tech) with input from Detroit Mercy in regard to curriculum design and grading. Students who successfully complete the course with an overall grade of B or above and have been admitted to one of the agreed upon programs will receive credits from Detroit Mercy that will apply towards their graduate degree program requirements when they come to Detroit Mercy to study.

Vel Tech will charge a tuition amount for this course as it sees fit but will inform Detroit Mercy of the amount that has been charged.

Detroit Mercy will accept one faculty member from Vel Tech designated to teach one of the Gateway courses and/or to ensure overall instructional quality and ongoing oversight of the program to visit Detroit Mercy for one or more months as agreed upon by Detroit Mercy and Vel



Tech. Detroit Mercy will provide access to facilities at Detroit Mercy and a faculty mentor, and will help facilitate the visiting faculty member in finding housing.

Article III - Graduate Transfer Credit

Applicants who are completing or who have completed a master's degree or postgraduate diploma, or who have taken graduate coursework at Vel Tech may, depending on the relevance of the coursework, transfer up to 6 credits into University of Detroit Mercy's master's programs, including those courses approved by Detroit Mercy and hosted by Vel Tech identified in Article II.

Article IV - Undergraduate Twinning Programs

Detroit Mercy and Vel Tech will explore undergraduate twinning programs (2+2). Vel Tech and Detroit Mercy will select two or three undergraduate programs where coursework from Vel Tech after the first two years could be accepted at Detroit Mercy for degree completion after two years of study at Detroit Mercy and the awarding of a Detroit Mercy undergraduate degree. The development of such a program would involve the evaluation of Vel Tech course descriptions for determination of correspondence to Detroit Mercy degree requirements.

The twinning program will be established with a view of enhancing Vel Tech's outreach and reputation as a premier institution of higher education by providing an international track for select students and for enriching the programs being offered at Vel Tech. The collaboration for Detroit Mercy will also enhance its educational quality and reputation through alliance with a premier institution in India.

It will provide an added benefit to students by reducing the cost of undergraduate higher education in the US, especially at a selective and highly ranked comprehensive university such as Detroit Mercy.

Furthermore, in recognition of this special collaboration, Detroit Mercy will award merit scholarships for undergraduate programs to Vel Tech students. The level of the scholarship will depend on the academic qualifications of the student. Students must also demonstrate evidence of English proficiency.

Article V - Mutual Visits

Detroit Mercy and Vel Tech will explore other possible exchanges such as mutual visits by university administrators, faculty exchanges, visits to Vel Tech by Detroit Mercy students, visits to Detroit Mercy by Vel Tech students, and so on. Details of such exchanges will be worked out at a later date as needed.

Article VI - Local laws

Visitors to both schools must observe local laws and regulations. Violation of laws of the host country or regulations of the host university shall subject the visiting students/scholars to immediate withdrawal of his/her immigration and academic sponsorship and/or immediate expulsion from the host country without refund of tuition or program fees.



Article VII - Indemnity Protection

Except to the extent of their negligence or intentional misconduct, neither Detroit Mercy nor Vel Tech, nor persons acting on their behalf, will be responsible to the other for any injury to, or death of, persons or damage to, or destruction of, property or for any other loss, damage, or injury of any kind whatsoever resulting from their performance of their respective duties and obligations under this Agreement.

Article VIII - Date of Implementation

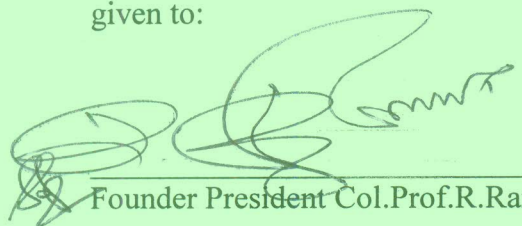
This agreement shall take effect immediately when signed by the President of Detroit Mercy and President of Vel Tech. The agreement will be in effect for three years from the date of signing, subject to revision or modification by written agreement, and thereafter until either party terminates the agreement. The implementation of this agreement shall be guided by this agreement and by the results of mutual consultation after the agreement is signed and in writing.

Article IX - Duration and Termination

Either party may terminate this Agreement for cause when it reasonably believes the other party has materially breached this Agreement by providing thirty (30) days' notice and the opportunity to cure the breach. If the breaching party does not cure the breach within thirty (30) days, the agreement can be terminated.

After the initial three (3) year term, either party may terminate this Agreement for any reason upon thirty (30) days' notice to the other party. Students currently enrolled in a program contemplated under this Agreement will be allowed to finish their course of study.

For Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, notice shall be given to:



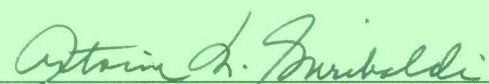
Founder President Col.Prof.R.Rangarajan

Date 16 MAY 2019

Col.Prof.Vel.Dr. R.Rangarajan
Founder Chancellor & President

Vel Tech
Rangarajan Dr. Sagunthala
Institute of Science and Technology
Chartered by University Reg. on 3-11-2008 Reg. 1089

For University of Detroit Mercy, notice shall be given to:



President Antoine Garibaldi, Ph.D.

Date August 14, 2019



Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
Deemed to be University Estd. in 3 of UGC Act, 1986

University of Detroit Mercy, USA

Name of the Research Institute/University/ Organization	Country	Duration of the Agreement	Academic Year	Date of Signing	Date of Expiry	Purpose/Activities
University of Detroit Mercy	USA	3 Years	2019-20	14.08.2019	13.08.2024	to establish academic cooperation and exchanges in regards to the following, Degree candidates from Vel Tech admit-ted into Graduate Degree at Detroit Mercy with fee waiver; Gateway Program (4+1 Program); To explore undergraduate twinning programs; Other possible exchanges such as mutual visits by university administrators, faculty exchanges.

Actual Activities with University of Detroit Mercy, USA	
A.Y. 2019-20	Faculty Mobility (Incoming - Short Courses) - 2 Delegates visited Vel Tech - 2

MOU Coordinator



Dean - International Relations

Dr. P. Suresh
Dean - International Relations

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
Deemed to be University Estd. in 3 of UGC Act, 1986



Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

School of Mechanical and Construction
Department of Mechanical Engineering

Specialized course on
“Modeling and Simulation of Mechantronics Systems”
(1157ME947)

by
Prof. Dr. Shuvra Das
University of Detroit Mercy, USA



Held on
Date: January 27 to 31, 2020

Shuvra Das

University of Detroit Mercy
4001 W.McNichols Road, Detroit, MI 48221
313-993-3380, email:dass@udmercy.edu

Professional Experience

Associate Dean (Research and Outreach), College of Engineering and Science, University of Detroit Mercy, Jan 2009-July 2015

Director, International Programs in E&S, 2017-present

Professor, Mechanical Engineering, July 2004-present.

Chair, Mechanical Engineering, Aug. 2002-Aug. 2003.

Visiting Researcher, Laboratorium für werkzeugmaschinen und Betriebslehre (WZL) at RWTH University in Aachen, Germany, Jan. 2002-July 2002.

Associate Prof., ME, UDM, MI, July 1998-July 2004

Assistant Prof., ME, UDM, MI, Dec.1993-June 1998.

Analysis Engineer, Concurrent Technologies Corporation, Johnstown, PA, Nov.1991-Nov.1993.

Post-Doctoral Research Associate, Univ. of NotreDame, NotreDame, IN, Jan.1991-Oct. 1991.

Teaching Assist., Iowa State University, Ames, IA, Aug. 1985- Dec.1990.

Education

Ph.D., Engineering Mechanics, Iowa State University, Ames, Iowa, May 1991. *Dissertation: Numerical Solution of Inverse Problems in Mechanics using the Boundary Element Method., Advisor: Prof. Ambar K. Mitra.*

M.S., Engineering Mechanics, Iowa State University, Ames, Iowa, 1987. *Thesis: Analysis of Boundary Integral Equation Method for Biharmonic Equation in Multiply Connected Domain, Advisor: Prof. Ambar K. Mitra.*

B.Tech (Hons.), Mechanical Engineering, Indian Institute of Technology, Kharagpur, India, 1985.

Administrative Experience

- Supported faculty in seeking funding, proposal development training and actual proposal writing for external grants.
- Developed, modernized and implemented many policies on grants and grant related research activities within the college.
- Worked with the Dean to launch the **Advanced Electric Vehicle Program**. The program was launched in partnership with and with input from Ford Motor Company. To date, over 200 students completed this graduate level certificate program.
- Developed the program plan, curriculum, marketing plan and the rest of the proposal for undergraduate degree program in **Robotics and Mechatronics System Engineering**; took it through the entire approval process within UDM to launch it successfully in 2011.

- Worked with the Director of International Recruitment to form partnerships with universities in China and India to recruit international students for a number of partnership programs. This program is currently a major source of students and revenue for the university.
- Worked extensively (in partnership with the Admissions office) to streamline the engineering freshmen recruitment. Developed a number of events including Research Symposium, Engineering Your Future, high school and college fair visits, summer camps etc. for recruitment of engineering students.
- Was involved in the early stages of conceptualization of the CASEE (Center for Automotive Systems Engineering Education) Lab. Led the advisory committee that did all the early work on this lab concept.
- Managed the college Budget on behalf of the Dean.
- Helped the new Dean with transition by running the college's day to day operation, organizing college events, approving expenditures, developing university-industry partnerships, developing university-high school partnerships, etc.
- Collaborated with other university offices such as Admissions, Budget, Advancement, Human Resources, Facilities, etc on a variety of projects that advanced the mission of the college.
- Served as the North Central-Higher Learning Commission Criterion 5 sub-committee chair for the 2015-16 Detroit Mercy HLC reaffirmation. Developed the report draft for this section.

Areas of Research Interest

- Mechatronics
- Modeling and Simulation of Mechatronic systems
- Manufacturing Process Design Through Thermo-Mechanical Analysis
- Numerical Techniques: Boundary Element and Finite Element Methods
- Multi-Disciplinary Design, Design Process
- Mechanistic Modeling of Manufacturing Process such as Casting, Welding, Metal Forming, Heat Treatment and Laser Assisted Forming
- Applied Mechanics and Stress Analysis
- Fuzzy Logic and Neural Network Applications
- Design Optimization
- Inverse Problems in Mechanics and Heat Transfer

Awards

- **Best Teacher Award**, ASEE North-Central Section, April 2002.
- **Faculty Achievement Award for Teaching and Research**, University of Detroit Mercy, October 2001.
- Listed in **Who's Who Among America's Teachers**, 1998, 2005.
- **Engineering Teacher of the Year Award**, Univ. of Detroit Mercy, April 1996, April 2009.
- **Engineering and Science Cornerstone Award**, UDM, 2016.

- **Nominated for Engr. Teacher of the Year Award**, 1995, 1997, 1999, 2000, 2001, 2004, 2007, 2009, 2019.
- Pi Tau Sigma "**Purple Shaft Award**", University of Detroit Mercy, 1996, 2016
- President's Award for **Teaching Excellence**, Iowa State University, 1990.

Funded Projects (to date)

1. **Capacitor Discharge Welding: A Review of the State-of-the-Art**, Ford Motor Company, \$20,000, 1995.
2. **Enhancement of Material Testing Laboratory**: NSF-ILI, \$67,000, 1996.
3. **Multimedia Based Course Module Development in Thermo-Physics**, NSF-Greenfield Coalition. (PI: Dr. Mark Schumack), \$244,000, 1995-96
4. **Research Initiation: Laser Forming**, Faculty Grant Incentive Program, University of Detroit Mercy, \$2200, 1996.
5. **Research Initiation: Laser Forming**, Soc.of Manufacturing Engineers, \$2550, 1996.
6. **Multimedia Based Course Module Development in Joining and Assembly**, NSF-Greenfield Coalition, \$125,000, 1998-99.
7. **Mechatronics: A Comprehensive Interdisciplinary curriculum**; NSF-CCLI, \$225,000, 1999(with Dr. Sandra Yost and Dr. Mohan Krishnan).
8. **Simulation Based Design System for Multi-Stage Manufacturing Processes, Phase II**: Air-Force Research Laboratory, \$43,000, 2000-2001.
9. **Course Module Development in Joining**, NSF-Greenfield Coalition, \$49,000, 2002-03.
10. **New Course Development in Advanced Mechatronics**, NSF-CCLI, \$174,000, '03-'05 (with Dr. Sandra Yost and Dr. Mohan Krishnan).
11. **UDM Multi-Disciplinary Student Project Development Advanced Prototyping and Electronic Sensing Systems**, DENSO North American Foundation, \$50,000, 2011.
12. **Ford Capital Equipment Grant**, \$50000, 2012, for renovation of the Automotive laboratory.
13. **Ford Capital Equipment Grant**, \$25000, 2015, for renovation of the INSPIRE laboratory.
14. **S-STEM: Scholarships for Robotics and Mechatronics Systems Engineering**, NSF-SSTEM, \$ 590,000, 2015.

Consulting

Weld Solidification Model Development, Concurrent Technologies Corporation, Johnstown, PA. (Sept. 1994-Dec. 1996).

Aarbor Pressure Predictions, Hydralock Corporation, Mt. Clemens, MI (several occasions since 2003)

Teaching Experience

SAE courses for professionals

Modeling and Simulation of Mechatronic Systems, 2-day course, 4 times

E-Machines for E-Drives, 6 hr. course (part of a week-long Hybrid Academy), 5 times.

Undergraduate

Introductory Mathematics for Engineers (Lecture)- 4 hrs. per week, 5 semesters

Mechanics of Deformable Bodies (Lecture) - 3 hrs. per week, 21 semesters

Mechanics of Deformable Bodies (Laboratory) - 3 hrs. per week, 20 semesters

Mechanical Engineering Design I - 3 hrs. per week, 6 semesters

Mechanical Engineering Design II - 3 hrs. per week, 3 semesters

Computer Aided Design (CAD) - 3 hrs. per week, 7 semesters

Advanced Metal Forming - 3 hrs. per week, 1 semester

Measurements Laboratory (co-taught) - 6 hrs. per week, 1 semester

Freshman Engr. Design – 3 hrs per week, 3 semesters

Joining Techniques – 3 hrs per week, 2 semester

Introduction to Mechatronics - 3 hrs. per week, 5 semesters

Modeling and Simulation of Mechatronic Systems-3 hrs. per week, 13 semesters

Finite Element Method - 3 hrs. per week, 7 semesters

Graduate

Finite Element Method - 3 hrs. per week, 6 semesters

Advanced Finite Elements – 3 hrs. per week, 2 semesters

Electric Drives and Electro-Mechanical Energy Conversion, 3 hrs. per week, 7 semesters.

Computer Aided Design (CAD) - 3 hrs. per week, 7 semesters

Introduction to Mechatronics - 3 hrs. per week, 5 semesters

Composite Material Design - 3 hrs. per week, 1 semester

Mechatronic Product Development - 3hrs. per week, 2 semester

Case Studies in Engineering Design- 3 hrs per week, 1 semester

Modeling and Simulation of Mechatronic Systems-3 hrs. per week, 13 semesters

Refresher Course for Professional Engineer

Taught a 4 hr. refresher course on ME Design (organized by Engineering Society of Detroit) to the engineers preparing to sit for the professional engineering exam (4 times).

Student Mentoring

Doctoral Dissertations Advised:

- ***Finite Element Modeling of High Speed Machining to Predict Tool Wear***, January 1995(co-advisor), student: Philip Akinyemi.
- ***Modeling and experimental verification of the laser forming process***, May 1995, student: Kennedy Odumodu.
- ***Practical Numerical Analysis of a Crack Near a Weld Subjected to Primary Loading and Hydrogen Embrittlement***, December 2003, student: Ayman Askari.
- ***Finite Element Simulation of Warm Forming Assisted Sheet Metal Bending***, May 2006, student: Ricardo Espinosa.

- ***Formation of Thermal Residual Stresses (TRSs) in Functionally Graded Materials (FGMs): A comprehensive study using the Ni-Al₂O₃ system***, May 2016, student: Farag Ali Khouja

Master's Theses Advised:

- ***Fuel Economy: A Fuzzy Logic Based Prediction Tool***, December 2001, student: Robert Sommerton.
- ***Vehicle Rollover Control using Magnetorheological Dampers***, August 2005, student: Arif Baig
- ***Modeling of Variable Force Actuators for Automotive Applications***, August 2007, student: Abhishek Kedia.
- ***Modeling of Thermo-mechanically actuated MEMS***, August 2007, student: Srinivas Chandrasekharan.
- ***Bondgraph based modeling of a CNC Drive***, May 2007, student: Pariksha Tomar.
- ***The parametric thermodynamic cycle analysis of a dual-spool, mixture exhaust turbofan engine***, October 2018, student: Jia Qi Wen.

Master's Capstone Design Advised:

- ***Adhesive Joints: A model based study***, August 2007 student: Nagarjuna Yagam.
- ***Reducing Conducted Transients in Automotive Windshield Wiper Motors***, August 2004, student: Robert Langdorf.
- ***Dynamic Modeling of a Hydraulic Power Steering System***, April 2003, student: Mohammad Akteruzzaman.

Publications and Presentations

Technical Area: Mechatronics

1. M. Krishnan, S. Das, S. A. Yost, "Team-Oriented, Project-Based Instruction in a New Mechatronics Course," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 13d4/1-13d4/6.
2. S. Das, S. A. Yost, M. Krishnan, "Effective Use of Web-Based Communication Tools in a Team -Oriented, Project-Based, Multidisciplinary Course," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp.13a2/14-13a2/17.
3. S. A. Yost, M. Krishnan, S. Das, "Mechatronics: A Comprehensive, Interdisciplinary Curriculum Development Initiative," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 13a1/1-13a1/1.
4. J. M. Weaver, S. Das, "Overhaul of an Undergraduate Mechanical Measurements Laboratory," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 12d3/10-12d3/16.
5. L. Carlson, S. A. Yost, M. Krishnan, S. Das, "Outcomes-Based Assessment for Comprehensive Curriculum Development in Mechatronics," presented at the

Frontiers in Education Conference (FIE'00), Kansas City, Mo, Oct 19-21, 2000, pp. t4a/1-t4a/5.

6. S. Das, M. Krishnan, S. A. Yost, "Mechatronics: A Comprehensive Interdisciplinary Curriculum Development Initiative," NSF Showcase presentation at the Frontiers in Education Conference (FIE'00), Kansas City, Mo, Oct 19-21, 2000 (poster only).
7. S. Das, M. Krishnan, S. A. Yost, "Advanced Mechatronics: Development of Two New Courses", NSF Grantees Conference 2005, February 16-18, 2005, Washington D.C.
8. S. Das, M. Krishnan, S. A. Yost, K. Zimmerman-Oster, "Advanced Mechatronics: Development of a Course on Modeling and Simulation of Mechatronic Systems", ASEE 2005, June 12-16, 2005, Portland Oregon.
9. S. Das, M. Krishnan, S.A. Yost, "The Outgrowth of Mechatronics Curriculum Development Efforts: An Undergraduate Concentration in Mechatronics", Frontiers in Education Conference (FIE'05), Indianapolis, IN, October, 2005.
10. M. Krishnan, S. Das, S. A. Yost, K. Zimmerman-Oster, "Advanced Mechatronics: Development of a Course on Sensors & Actuators for Mechatronic Systems", ASEE 2006, June 18-21, 2006, Chicago, IL.
11. A. Baig, I. Mahmood, S.Das, "Modeling of MEMS Devices for Automotive Applications," **paper 2005-01-1447, SAE 2005.**
12. S. Das, A. Baig, C. Naidu, "Benchmarking Software Tools for Mechatronic Applications," **paper 2005-01-1310, SAE 2005.**
13. R. Langdorf, S. Das, M. Krishnan, "Reducing Conducted Transients in Automotive Windshield Wiper Motors", **paper 2006-01-0297, SAE 2006.**
14. M. Krishnan, S. Das, S. A. Yost, K. Zimmerman-Oster, "A Mechatronics Curriculum Development Initiative: Relevance, Content, and Results from an 8-Year Effort," 5th Annual Conference on Engineering for the Americas, Rio De Janerio, Brazil, October 2006.
15. P. Tomar, S.Das, "Bond Graph Modeling and Simulation of a Closed-Loop Feed Drive System for a CNC Machine," **paper 2007- 01-1637, SAE 2007.**
16. Shuvra Das, Sandra A. Yost, Mohan Krishnan, "A Ten-Year Mechatronics Curriculum Development Initiative: Relevance, Content, and Results - Part I," **IEEE Transactions on Education in May 2010, 194-201, 53 (2), 2010.**
17. Mohan Krishnan, Shuvra Das, Sandra A. Yost, "A Ten-Year Mechatronics Curriculum Development Initiative: Relevance, Content, and Results - Part II," **IEEE**

Transactions on Education in May 2010, 202-208, 53(2), 2010.

18. Shuvra Das, Leo E. Hanifin, Sean Newell, A New Responsive Model for Educational Programs for Industry: The University of Detroit Mercy Advanced Electric Vehicle Graduate Certificate Program, **paper 2010-01-2303**. SAE Convergence 2010.
19. Shuvra Das, Leo E. Hanifin, Sean Newell, "A New Responsive Model for Educational Programs for Industry: The University of Detroit Mercy Advanced Electric Vehicle Graduate Certificate Program," **SAE International Journal of Passenger Cars- Electronic and Electrical Systems**, 3(2), pp 10-18, Dec. 2010.

Technical Area: Computational Mechanics

20. A. K. Mitra and S. Das, "Nonuniqueness in the Integral Equation Formulation of the Biharmonic Equation in Multiply Connected Domains," **Computer Methods in Applied Mechanics and Engineering**, Vol. 69, pp. 205-213, 1988.
21. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Laplace Problems and its Application in Flaw Identification in Materials," **Journal of Computational Physics**, 99, 1992, pp. 99-106.
22. S. Das and A. K. Mitra, "Use of Boundary Element Method for the Determination of Tool Shape in Electro-Chemical Machining," **International Journal for Numerical Methods in Engineering**, 35(5), 1992, pp.1045-1055.
23. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Laplace Problems using BEM," presented at the 21st. Midwestern Mechanics Conference, Houghton, MI, Developments in Mechanics (Ligon, et. al. eds.), Mich. Tech. Univ., Aug. 1989, pp.525-526.
24. A. K. Mitra and S. Das, "Solution of Inverse Problems Using Boundary Element Method," BETECH '92, Albuquerque, New Mexico (C. A. Brebbia and M. S. Ingber, eds.), Computational Mechanics publ., June 1992, pp. 721-731.
25. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Heat Conduction Problem using Boundary Element Method," presented at the Annual Meeting of the Society of Engineering Science, Santa Fe, NM, Oct. 1990.
26. S. Das, "Solving Groundwater Problems using Boundary Elements," presented at the 100th. Annual meeting of Iowa Academy of Science, Ames, Iowa, April 1988.
27. N. Yagam and S. Das, "Finite Element Modeling of Adhesive Joint Behavior for Automotive Applications", **paper 6M-36, SAE 2006**.

Technical Area: Manufacturing Process Modeling

28. S. Das and A. J. Paul, "Determination of Interfacial Heat Transfer Coefficient in Casting and Quenching Using a Solution Technique for Inverse Problems Based on the Boundary Element Method," **Metallurgical Transactions B**, Vol. 24B, Dec.1993, pp. 1077-1088.
29. G. K. Upadhyaya, S. Das, U. Chandra and A. J. Paul, "Modeling the Investment Casting Process: A Novel Approach for View Factor Calculations and Defect Prediction," **Applied Mathematical Modeling**, Vol. 19, June 1995, pp.354-362.
30. S. Das, V. K. Suri, U. Chandra and K. Sampath, "A One Dimensional Mathematical Model for Selecting Plasma Spray Process Parameters," **Journal of Thermal Spray Technology**, Vol. 4 (2), June 1995, pp. 153-165.
31. K.Odumudu and S.Das, "A Numerical and Experimental Study of Forceless Forming Using Lasers," **Computer Modeling and Simulation in Engineering**, Vol 2, August 1997, pp.243-266.
32. S. Das, M. Klotz, and F. Klocke, "EDM Simulation: Finite Element Based Calculation of Deformation, Micro-structure and Residual Stresses", **Journal of Material Processing Technology**, Vol 142, Nov 2003, pp. 434-451.
33. S. Das, G. Antonoglou, and F. Klocke, "Simulation of Fluid Flow in the Vicinity of the Electrode and the Workpiece in the Wire-EDM Process", submitted to **Journal of Material Processing Technology** for publication.
34. A. Askari, S. Das, "Practical Numerical Analysis of a Crack Near A Weld Subjected To Primary Loading And Hydrogen Embrittlement", **Journal of Material Processing Technology**, Vol. 173, March 2006, 1-13.
35. S. Das, S. Paolucci and M. Sen, "The Minimization of the Solidification Time of a Thin Cylindrical Shell, presented at ASME Winter Annual Meeting, Fundamentals of Phase Change: Freezing, Melting and Sublimation, ASME HTD, V. 215, pp. 79-87, Nov. 8-13, 1992.
36. S. Das, G. Upadhyaya, U. Chandra, M. J. Kleinosky and M. L. Tims, "Finite Element Modeling of Single-Pass GMA Weldment," Modeling of Casting, Welding and Advanced Solidification Processes VI, T. S. Piwonka, V. Voller and L. Katgerman, eds., TMS, Palm Coast, FL, March 21-23, 1993, pp.593-600.
37. S. Das, D. K. Moyer, M. L. Tims, G. Upadhyaya and M. J. Kleinosky, "Modeling Heat Transfer, Microstructure Development, Transformation Plasticity and Residual Stresses in GMA Multi-Pass Butt Welds," presented at International Conference on Modeling and Control of Joining Processes, Miami, FL, December 8-10, 1993, Orlando, FL, edited by T. Zacharia, American Welding Society, Miami, FL, 1994 (published in proceedings, 8 pages).

38. S. Das and A. J. Paul, "Determination of Interfacial Heat Transfer Coefficient in Castings Using a Solution Technique for Inverse Problems Based on the Boundary Element Method, "Modeling of Casting, Welding and Advanced Solidification Processes VI, T. S. Piwonka, V. Voller and L. Katgerman, eds., TMS, Palm Coast, FL, March 21-23, 1993, pp.647-654.
39. S. Das, G. Upadhyaya and U. Chandra, "Prediction of Macro- and Micro-Residual Stress in Quenching Using Phase Transformation Kinetics," Quenching and Control of Distortion, G. Totten, ed., ASM, Chicago, Illinois, 1992, p.229-234.
40. S. Das, V. K. Suri, U. Chandra and K. Sampath, "A One Dimensional Mathematical Model for Selecting Plasma Spray Process Parameters," presented at the National Thermal Spray Conference, June 20-24, 1994.
41. S. Das, G. Upadhyaya and A. J. Paul, "A Geometric Approach to Optimized Riser Design in Castings," presented at the TMS Annual Meeting, Feb. 26-March 3, 1994. (paper published in proceedings, 11 pages).
42. D.K. Moyer, R.E.Smelser, M.J.Kleinosky, S.Das, "The Effect of Bead Lumping Strategies on Residual Stress Prediction in GMA Multi-Pass Welds," ASM-TMS Materials Week, Oct 2-6, 1994, Rosemont,IL.
43. S. Das, V. Ramnarayan, K. G. Anand and K. C. Wang, "Prediction of Wrinkling during the HIP consolidation of b1S Ti/Si Cf Composite Panels, presented at the TMS Annual Meeting, Feb. 26-March 3, 1994 (paper published in proceedings, 8 pages).
44. G. K. Upadhyaya, S. Das, U. Chandra and A. J. Paul, "Geometric Methods for Simulating Solidification Heat Transfer in Casting Processes," presented at the 1994 ASME Thermophysics and Heat Transfer Conference, ASME Current developments in Numerical Simulation of Flow and Heat Transfer, ASME HTD, v.275, pp. 43-56, June 20-23, 1994.
45. K. Odumodu and S.Das, "Laser Shaping: A Numerical and Experimental Study," presented at the 32nd. Annual Conference of Society of Engineering Science, pp. 405-406, Oct.29-Nov. 2, 1995.
46. K. Odumodu and S.Das, "Forceless Forming using Laser," presented at the ASME winter Annual Meeting, Advanced Materials: Development and Characterization, Processing and Mechanical Behavior, ASME publ., pp. 169-170, November 1996, Atlanta, GA.
47. P. Akinyemi, Y.S. Chadda, and, S.Das, "A Finite Element Model to Predict Heat Generation and Tool Life in 3-D Oblique Cutting," presented at the 33nd. Annual Conference of Society of Engineering Science, Oct.1996 (paper published in proceedings, 8 pages).

48. U. Chandra, G.K. Upadhya, S. Das, and M.N. Davis, "Simplified Models for Simulation of Heat Treating Processes," presentation, 21st ASM Heat Treating Society Conference, Indianapolis, IN, November 2001.
49. S. Das, "On Modeling Multi-pass Welding: Prediction of Residual Stresses and Microstructures," second International Conference on Theoretical, Applied, Computational and Experimental Mechanics (ICTACEM 2001) Kharagpur, India, Dec. 27-30,2001, paper 110 (pp. 1-12), electronic proceedings published.
50. S. Das, "Enabling Agility in a Changing Automotive Environment: Mechanics to Mechatronics, A Perspective on Simulation," International Conference on Agile Manufacturing (ICAM2006), July 19-20, 2006, Norfolk, VA.
51. R. H. Espinosa, S. Das, J. Weaver, "Simulation of Warm Forming Assisted Hemming to Study the Effect of Process Parameters on Product Quality, **paper 07M-230, SAE 2007.**
52. Geo Joy, Shuvra Das, Nassif Rayess, "MacPherson Suspension: Modeling, Simulation, and Validation," **paper 19SS-0277, SAE 2019 (in review).**

Technical Area: Curriculum Development and ABET

53. S. Das, "Modernization of Material Testing Laboratory Curriculum," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 12d3/17-12d3/22.
54. M. Schumack, M. Vaksman, S. Das, K. Belfield, M. Ssemakula, R. Pryor, V. Sheyman, and W. W. Schultz,"Thermophysics for Manufacturing Engineers: A Nontraditional Approach," 1997 ASEE Annual Conference Proceedings, 11 p., 1997.
55. S. Das, M. Schumack, M. Vaksman, K. Belfield,"Development and Implementation of the Thermophysics Knowledge Area for the Greenfield Coalition for New Manufacturing Engineering Education," International Conference on Engineering Education (eds. D. Throgmorton, J. Evers, J. Mead, and M. Kulkarni), College of Engr., Southern Illinois University at Carbondale, Aug. 13-15,1997,Chicago, IL, pp. 466-477.
56. Dan Budny, Mohan Krishnan, Shuvra Das, and Mark Paulik, Ronald R. DeLyser, Hamid Khan, Donald Elger, Charles F. Yokomoto, James Rowland, Mitchell Litt, and Donald Carpenter "Assessment: When is Enough, Enough?", paper for special session on ABET and assessment at FIE-2003, Boulder, CO, Nov 2003.
57. Shuvra Das, "Implementing a Multi-Media Case Study in a Traditional Laboratory Class," ASEE 2006, June 18-21, 2006, Chicago, IL.

58. S. Das, "Implementing the Wright State Model for Engineering Mathematics at University of Detroit Mercy," to be presented at International Mechanical Engineering Congress and Exposition, Nov. 9-15, 2018, Pittsburgh, PA.

Invited Presentations

59. S. Das, "Modeling of Gas Metal Arc Welding." at Army Tank Command (TACOM) in Warren, MI. (July, 1994).
60. S. Das, "Inverse Problems and Their Solutions Using BEM," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
61. S. Das, "Use of FEA in Modeling Manufacturing Processes: Welding and Metal Cutting," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
62. S. Das, "Use of Fuzzy Logic in Solving Engineering Problems," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
63. S. Das, "X-by-wire in Automotive Industry and its Impact on Curriculum and Research," Indian Institute of Science, Bangalore, India, January 3, 2006.
64. S. Das, "Simulating Engineering Systems Using Bond Graphs," Michigan Simulation Users Group meeting, June 19, 2007.

Project Report to Sponsor

65. S. Das, S. Paolucci and M. Sen, "Solidification of Metals in Die-Casting," Report submitted to sponsor upon completion of Phase I of the project, University of Notre Dame, Sept. 1991, 78 pages.
66. S. Das, "Capacitor Discharge Welding", Report submitted to Ford Motor Company upon completion of a funded project, May 1996.

Book Chapter

67. S. Das and U. Chandra, "Residual Stress and Distortion," Chapter 6 in **Handbook of Aluminum: Vol I, Physical Metallurgy and Processes**, G. E. Totten and D. S. Mackenzie (eds.), Marcel Dekker, Inc., New York, NY (2003) pp.305-350.
68. S. Das, P. Goswami, D. Chakraborty, "The managerial technical investment decision making process, in light of the disruptive impact of Internet of Things (IoT) technology," Automation Alley, **Technology in Industry 4.0 Report**, 2019 (in preparation).

Books

69. Nader Zamani and Shuvra Das, “**ABAQUS for Catia V5: Tutorials**,” SDC Publications, Nov. 2006.
70. Nader Zamani and Shuvra Das, “**ABAQUS for Catia V5 Tutorials: AFC 2.5**,” SDC Publications, APR. 2008.
71. Shuvra Das, “**Mechantronic Modeling and Simulation Using Bondgraphs**,” CRC Press, Mar. 2009.
72. Shuvra Das, “**Modeling and Simulation of Mechatronic Systems Using SimScape**,” Morgan & Claypool Publishers, 2019 (manuscript in preparation).

Affiliations

ASME, Tau Beta Pi, Sigma Xi, ASM, SME, ASNT, ASEE

Outreach and Service Activities

- Made presentations on Engineering as a Career to many High School classes during high school career days (Holy Redeemer, Brother Rice, Southfield High School, Detroit Mayor’s Conference for Youth).
- Taught CAD classes to female high school students as part of the “Women’s Summer Design Institute” program at UDMercy, 1999-2001.
- Taught Mechatronics classes to visiting high school students as part of the “College Class for a Day” program at UDMercy 1999-2001.
- Advisor to the local ASME student section, 1998-2004.
- Served on several college and university committees at UDM such as FGIP, Bookstore, and several departmental committees.
- Organized and hosted the ASME Region V ME Department Head’s meeting at UDM, May 2003
- On several occasions, provided free engineering consulting services to local industries.
- Served on the college ad-hoc committee for Promotion and Tenure 2013-2016.
- Served on the College Co-op advisory committee, 2009-2016.
- Served on the Advisory Committee for OSPRA, 2009 - present
- Subcommittee chair for Criteria 5 on the Higher Learning Commission Accreditation self-study committee.
- Chief Faculty marshal on the Commencement Committee, 2014-2017.
- Served on the University Research Day Committee 2012-2016
- Served on College FGIP (Faculty Grant Incentive program) committee 1998-‘05.
- Served on the University tenure and promotion committee (2005-2009).
- Served on the College tenure and promotion committee (2004-2005), (2016-2017).
- Faculty Advisor for Engineering Honor Society, TBP (2013-present).

- Served on the College Technology Discovery Day committee for 3 years 1998-2000.
- Served as chairperson of the Mechanical Engineering Department 2002-2003.
- Served on the college ABET committee 2002-2003.
- Served on the College leadership committee 2002-2003, 2009-2015.
- Served on departmental sub-committees for Design and Manufacturing 2002-present.
- Served on several departmental faculty search committees.
- Occasional fill-in for ME Chair during his absence.

Other Professional Activities

- **Co-chaired** a technical session on the role of mechanics in materials processing and manufacturing processes at the 32nd. Annual meeting of the Society of Engineering Science (Oct.,1995, New Orleans, LA).
- **Co-chaired** a technical session on the role of mechanics in materials processing and manufacturing processes at the 33nd. Annual meeting of the Society of Engineering Science. (Oct.,1996, Tempe, AZ).
- **Participated** in a NSF funded workshop on Concurrent Engineering: 3-D Modeling, Analysis and Manufacturing, University of Texas, Austin (August 1996, Austin, TX)
- **Participated** in a NSF funded workshop on Learner Centered, Project-Based Workshop on Collaborative Learning, University of Notre Dame, Notre Dame (July 1997, Notre Dame, IN).
- **Participated** in a NSF funded workshop on Using Case Studies in the Teaching of Engineering, Auburn University, Sept 27-29, 2001 (Auburn, AL).
- **Organized and Hosted** the ASME Region V ME Department Head's meeting at UDM, May 2003.
- **Participated** in a NSF funded workshop on Using Case Studies in the Teaching of Engineering, Auburn University, Sept., 2005 (Auburn, AL).
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2006.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2007.
- **Chaired** a session on Automotive Systems at the International Conference on Agile Manufacturing (ICAM 2006), July 19-20, 2006, Norfolk, VA.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2008.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2009.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session SAE201) at SAE 2010.
- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in October 2009.
- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in April 2010.

- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in October 2010.

References

- Dr. Michael Jenkins, Professor and Chair, Mechanical Engineering Department, University of Detroit Mercy, 4001 W. McNichols Road, Detroit 48219, USA, (313) 993-1242, fax: 313-993-1187, jenkinsm@udmercy.edu.
- Dr. N. Mohankrishnan, Professor, Electrical Engineering Department, University of Detroit Mercy, 4001 W. McNichols Road, Detroit 48219, USA, (313) 993-3367, fax: 313-993-1187, mohank@udmercy.edu.
- Dr. Tim Taylor, Staff Engineer, Advanced Mechanical Design, GE Transportation, Aircraft Engines, (513) 243-6946, (513) 243-2869 FAX, timothy.w.taylor@ae.ge.com
- Dr. Ambar K. Mitra, Associate Prof. Aerospace Engineering and Engineering Mechanics, Iowa State University, Ames, IA 50011, (515) 294-2694, USA, akmitra@iastate.edu.
- Dr. Yogendra S. Chadda, Professor and former Chair (retired), Mechanical Engineering Department, University of Detroit Mercy, 214 W. Thomas Ct Middletown, DE 19709-6850, 302-449-2023.
- Dr. Gary Kuleck, Provost and Academic Vice President, Oregon Technological University, 541-885-1663, gary.kuleck@oit.edu.

Outlines of proposed courses for a week-long teaching stint at Veltech

Shuvra Das

Professor of Mechanical Engineering

University of Detroit Mercy

Detroit, MI 48221

Modeling and Simulation of Mechatronic Systems

Concepts of mechatronics are particularly vital in today's engineering world since more and more products are multi-disciplinary in nature. Complex machines such as the automobile have changed dramatically over the years. The basic functionality of an automobile, i.e. using power derived from an internal combustion engine to drive the vehicle along a path as per the desire of the vehicle's controller or the driver, has not changed. The way this is achieved in an optimal manner has changed significantly with the passage of time. Less efficient, purely mechanical devices and sub-systems have been replaced by mechatronic or electronic ones. Fuel injectors have replaced less efficient carburetors. Anti-lock brakes are important safety devices and are becoming part of the basic package for all automobiles. Similarly, "by-wire" sub-systems such as drive by-wire, brake by-wire, steer by-wire, smart suspensions, are all systems that are being incorporated in automobiles. In all of these cases mechatronic devices are replacing purely mechanical ones. It is quite clear that the concept of mechatronics has become very popular due to a very practical necessity derived from technological progress. Today's engineers cannot confine themselves anymore to the safe haven of their own familiar disciplines. The technological world out there will force them to venture into multidisciplinary territory and the sooner one does that the better prepared he or she will be.

While systems are made of components (or sub-systems) a system is much more than just the sum of all its parts. Even though the parts that make up a system can be well designed and work well independently, it does not necessarily mean that the system will function well when these components are all put together. For a successful final product a "systems viewpoint" is thus very important. Engineering System modeling has always been multi-disciplinary in nature. A review of any of the classical texts in system modeling reveals this. In the Mechatronic systems world it is more so the case. In traditional approaches to modeling multi-disciplinary systems the governing equations are derived from a combination of Newton's Laws, Kirchoff's laws, Bernaulli's equations, electromagnetism, and other fundamental governing equations from different domains. Students have a difficult time dealing with the application of these laws in the derivation of system equations especially since almost always they have some level of mastery in their own discipline but lack confidence in disciplines that are not theirs. The root cause of this is in how we are trained. Within each discipline of engineering, system representation and solution techniques have evolved along different paths. We are trained to think of statics, dynamics, circuit analysis, electromagnetism, hydraulics, etc to be different stand-alone subject areas where different solution techniques are used for problem solving. These artificial barriers between different disciplines or subjects highlights the differences without providing a hint of the fact that the underlying similarities are much more important and profound than the perceived differences.

This concept of similarities among different disciplines has been used in the modeling method called Bond graphs. In this course, we will use the bond graph representation of multi-domain systems. Within the bond graph method, basic components that make up systems in different disciplines may be represented in terms of a few generalized components. The similarities that already exist amongst the different disciplines are used

very efficiently by this method. Bond graph method is based on the flow of power. Power is a product of two quantities, force and velocity or voltage and current (these are called effort and flow as generalized quantities). Every component in reality has to deal with these two quantities that make up power. Drawing of the bond graph representations is algorithmic and as a result the user can become productive quite quickly. The derivation of equations from the bond graph representation of a system is algorithmic as well. So, a computer program can easily do it. For the user who is not an expert in every discipline the algorithmic approach is a lot more robust and confidence-generating for the user than any other method. All these advantages make the bond graph method a very powerful tool for modeling mechatronic systems. This proposal author has written a text on this subject (https://www.amazon.com/Mechatronic-Modeling-Simulation-Using-Graphs-ebook/dp/B00TIXQYJ6/ref=sr_1_6?keywords=shuvra+das&qid=1568125971&s=gateway&sr=8-6) and has taught this semester-long course for fourteen years.

For this course the use of the Bond graph method in modeling mechatronic systems will be taught from first principles along with the implementation of the modeling technique in examples that will slowly evolve from the simple and single-domain, to the very complex and multi-domain. Use of software tools such as 20Sim and Simscape will also be covered during this very hands-on course so that the students can end with a broader view of multi-disciplinary systems and a decent level of mastery and thorough understanding.

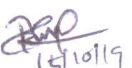
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Details of Professor & Course:

Name of the Professor	Prof. Dr. Shuvra Das (Profile Attached)
University & Country	University of Detroit Mercy, Detroit, USA
Title of the Course	Modeling and Simulation of Mechatronics Systems (Contents Attached)
Department	Mechanical Engineering
Dates of the Course	January 27 to 31, 2020
Total No. of Hours	15
No. of Credits	1
Category	Industry/ Higher Institute Learning
Course Content	Attached

Prepared by: 
15/10/19.

Coordinator – Directorate of Intl. Relations

Forwarded by: 
15/10/19.

Director – Directorate of Intl. Relations



HoD



Dean



Director (Academic)



Vice Chancellor

Prof. Dr. A. J. Ravichandran
Head of the Department
Mechanical Engineering

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Prof. Dr. A. T. Ravichandran
Dean SoMC

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Prof. Dr. techn. Koteswara Rao Anne
Director Academics

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Prof. V. S. S. Kumar
Vice Chancellor

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SNo	Stu_Id	Stu_Name	Stu_Degree	Stu_Branch	Stu_Test_Subject Code	Stu_Test_SubjectName	Stu_Subject_Pass/Fail	Stu_Grade
1	VtU8858	MOHAMED SHAHUL HAMEED B	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
2	VtU9922	DANIEL PAUL AUGUSTINE D	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
3	VtU9345	JAVID AHAMED M J	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	D
4	VtU8879	THURABUDDEEN M	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
5	VtU11635	JERIN KENNEDY J	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
6	VtU9166	YEDLAPALLI SAI	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
7	VtU10743	HAVIS RAVI	B.Tech	Mechatronics	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
8	VtU9561	NELLURI RISHENDRA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
9	VtU9381	GAVINI ADITHYA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
10	VtU10241	GEDDAM BHARGAV	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
11	VtU8799	BHIMANA VENKATA SAI CHARAN	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
12	VtU14538	CHINTHA SANDEEP KUMAR REDDY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
13	VtU8670	KATTA AKHIL KUMAR	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
14	VtU9570	MACHAVARAPU VASUDEVA RAO	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
15	VtU10140	CHERUKURI ANUDEEP	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
16	VtU10910	SIRIGIREDDYERRAGURAPPAGARID	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
17	VtU9920	AVULA CHANDRAPRAKASH	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
18	VtU9358	BARATH M	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
19	VtU11059	KAGITHA HARIVIND	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
20	VtU7904	JEYANTH KUMAR J	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
21	VtU8692	CHENNAMSETTY DIVYESH RAHUL	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
22	VtU10483	BANDARU KRISHNA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
23	VtU12258	CHENNUBAI NAGARAJU	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
24	VtU10648	HARSHIT KUMAR GHONGE	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	NE	NE
25	VtU8803	CHALASANI KRISHNA CHAITHANYA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
26	VTU10938	SATHISH VIJAYDHARAN	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
27	VtU9150	KATAKAMSETTI JYOTHI SAI RAM KU	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	NE	NE
28	VTU11044	BALE SUSANTH	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
29	VTU10934	ALURU MADAN MOHAN REDDY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
30	VTU10937	KATARI NAVEEN KUMAR	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
31	VtU9679	KAGITHA HARA NAGA DIVYA VENKA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
32	VtU10077	PAMARTHI SAI BHARGAV	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
33	VtU10072	RAVULAPALLI SAI TARUN	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
34	VTU11010	BATHINA VENKATESWARLU	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B

SNo	Stu_Id	Stu_Name	Stu_Degree	Stu_Branch	Stu_Test_Subject Code	Stu_Test_SubjectName	Stu_Subject_Pass/Fail	Stu_Grade
35	VtU10157	PALAGIRI CHANNIKYA VARDHAN REDDY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
36	VtU8787	THOTA VENKATA SUBRAHMANYA REDDY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
37	VtU10094	SHAIK KALESHAVALI	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
38	VtU7618	D R RAMAKRISHNAN	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
39	VtU9918	BOINI SURYA PRAKASH	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
40	VtU7634	VUTUKURI SANJEEVA REDDY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
41	VtU7636	AKAASH G	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
42	VtU10481	SURAJ PANDEY	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
43	VtU10925	S PONVELGANESHAN	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
44	VtU7704	PONNADA SRIKAR SAITEJ	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
45	VtU7713	RAJESH KUMAR D	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
46	VtU8842	MADDUKURI PRUDHVIRAJ	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
47	VtU7542	KAUSHIK R	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
48	VtU7719	KUNDU BHARADWAJ	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
49	VtU8358	ILLIPILLI JYOTHSWAROOP	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A
50	VtU7764	BALAJI M	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	C
51	VtU10437	RISHI SAHNI	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	B
52	VtU9291	KAMALAPATI UPENDRA	B.Tech	MECHANICAL	1157ME947	Modeling and Simulation of Mechatronic Systems	Pass	A



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Our Ref. No: 2019-2020/ VF 196 & 197

Your Ref. No:

Submitted for the Approval:

Name of the Professor: Prof. Dr. Shuvra Das

University & Country : University of Detroit Mercy, USA

Course Titles : 1. Modeling and simulation of Mechatronics Systems (15Hrs) ✓
2. Modeling and simulation of Electric and Hybrid Electric vehicles ✓
(15 Hrs)

Department : 1. Mechanical Engineering ✓
2. Automobile Engineering ✓

Participants : Course 1: 45 students ✓
Course 2: 50 Students ✓

Program date : January 27 to 31, 2020

Sl. No	Description	Amount in INR
1	Course Honorarium (Rs.3000 * 30Hrs) (Net Amount & Tax Free)	90,000 ✓
	Total	90,000

(Rupees Ninety thousand only)

In this regard, I request your approval for transferring the amount in INR to the following Account,

Name: Shuvra Das & Sunil Kumar Das

Account No: 11960100054727

Bank: Federal Bank

IFSC code: FDRL0001196

PAN No: ADNPD6776C

Entered in Budget Register

Pg. 11, Sl. 45

Thank You,

S. Sivaperumal



Signature
04/02/2020



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(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

School of Mechanical and Construction

Department of Automobile Engineering

Specialized course on
“Modeling and Simulation of Electric and Hybrid Electric
Vehicles”
(1157AU907)

by

Prof. Dr. Shuvra Das

University of Detroit Mercy, USA



Held on

Date: January 27 to 31, 2020

Shuvra Das

University of Detroit Mercy
4001 W.McNichols Road, Detroit, MI 48221
313-993-3380, email:dass@udmercy.edu

Professional Experience

Associate Dean (Research and Outreach), College of Engineering and Science, University of Detroit Mercy, Jan 2009-July 2015

Director, International Programs in E&S, 2017-present

Professor, Mechanical Engineering, July 2004-present.

Chair, Mechanical Engineering, Aug. 2002-Aug. 2003.

Visiting Researcher, Laboratorium für werkzeugmaschinen und Betriebslehre (WZL) at RWTH University in Aachen, Germany, Jan. 2002-July 2002.

Associate Prof., ME, UDM, MI, July 1998-July 2004

Assistant Prof., ME, UDM, MI, Dec.1993-June 1998.

Analysis Engineer, Concurrent Technologies Corporation, Johnstown, PA, Nov.1991-Nov.1993.

Post-Doctoral Research Associate, Univ. of NotreDame, NotreDame, IN, Jan.1991-Oct. 1991.

Teaching Assist., Iowa State University, Ames, IA, Aug. 1985- Dec.1990.

Education

Ph.D., Engineering Mechanics, Iowa State University, Ames, Iowa, May 1991. *Dissertation: Numerical Solution of Inverse Problems in Mechanics using the Boundary Element Method., Advisor: Prof. Ambar K. Mitra.*

M.S., Engineering Mechanics, Iowa State University, Ames, Iowa, 1987. *Thesis: Analysis of Boundary Integral Equation Method for Biharmonic Equation in Multiply Connected Domain, Advisor: Prof. Ambar K. Mitra.*

B.Tech (Hons.), Mechanical Engineering, Indian Institute of Technology, Kharagpur, India, 1985.

Administrative Experience

- Supported faculty in seeking funding, proposal development training and actual proposal writing for external grants.
- Developed, modernized and implemented many policies on grants and grant related research activities within the college.
- Worked with the Dean to launch the **Advanced Electric Vehicle Program**. The program was launched in partnership with and with input from Ford Motor Company. To date, over 200 students completed this graduate level certificate program.
- Developed the program plan, curriculum, marketing plan and the rest of the proposal for undergraduate degree program in **Robotics and Mechatronics System Engineering**; took it through the entire approval process within UDM to launch it successfully in 2011.

- Worked with the Director of International Recruitment to form partnerships with universities in China and India to recruit international students for a number of partnership programs. This program is currently a major source of students and revenue for the university.
- Worked extensively (in partnership with the Admissions office) to streamline the engineering freshmen recruitment. Developed a number of events including Research Symposium, Engineering Your Future, high school and college fair visits, summer camps etc. for recruitment of engineering students.
- Was involved in the early stages of conceptualization of the CASEE (Center for Automotive Systems Engineering Education) Lab. Led the advisory committee that did all the early work on this lab concept.
- Managed the college Budget on behalf of the Dean.
- Helped the new Dean with transition by running the college's day to day operation, organizing college events, approving expenditures, developing university-industry partnerships, developing university-high school partnerships, etc.
- Collaborated with other university offices such as Admissions, Budget, Advancement, Human Resources, Facilities, etc on a variety of projects that advanced the mission of the college.
- Served as the North Central-Higher Learning Commission Criterion 5 sub-committee chair for the 2015-16 Detroit Mercy HLC reaffirmation. Developed the report draft for this section.

Areas of Research Interest

- Mechatronics
- Modeling and Simulation of Mechatronic systems
- Manufacturing Process Design Through Thermo-Mechanical Analysis
- Numerical Techniques: Boundary Element and Finite Element Methods
- Multi-Disciplinary Design, Design Process
- Mechanistic Modeling of Manufacturing Process such as Casting, Welding, Metal Forming, Heat Treatment and Laser Assisted Forming
- Applied Mechanics and Stress Analysis
- Fuzzy Logic and Neural Network Applications
- Design Optimization
- Inverse Problems in Mechanics and Heat Transfer

Awards

- **Best Teacher Award**, ASEE North-Central Section, April 2002.
- **Faculty Achievement Award for Teaching and Research**, University of Detroit Mercy, October 2001.
- Listed in **Who's Who Among America's Teachers**, 1998, 2005.
- **Engineering Teacher of the Year Award**, Univ. of Detroit Mercy, April 1996, April 2009.
- **Engineering and Science Cornerstone Award**, UDM, 2016.

- **Nominated for Engr. Teacher of the Year Award**, 1995, 1997, 1999, 2000, 2001, 2004, 2007, 2009, 2019.
- Pi Tau Sigma "**Purple Shaft Award**", University of Detroit Mercy, 1996, 2016
- President's Award for **Teaching Excellence**, Iowa State University, 1990.

Funded Projects (to date)

1. **Capacitor Discharge Welding: A Review of the State-of-the-Art**, Ford Motor Company, \$20,000, 1995.
2. **Enhancement of Material Testing Laboratory**: NSF-ILI, \$67,000, 1996.
3. **Multimedia Based Course Module Development in Thermo-Physics**, NSF-Greenfield Coalition. (PI: Dr. Mark Schumack), \$244,000, 1995-96
4. **Research Initiation: Laser Forming**, Faculty Grant Incentive Program, University of Detroit Mercy, \$2200, 1996.
5. **Research Initiation: Laser Forming**, Soc.of Manufacturing Engineers, \$2550, 1996.
6. **Multimedia Based Course Module Development in Joining and Assembly**, NSF-Greenfield Coalition, \$125,000, 1998-99.
7. **Mechatronics: A Comprehensive Interdisciplinary curriculum**; NSF-CCLI, \$225,000, 1999(with Dr. Sandra Yost and Dr. Mohan Krishnan).
8. **Simulation Based Design System for Multi-Stage Manufacturing Processes, Phase II**: Air-Force Research Laboratory, \$43,000, 2000-2001.
9. **Course Module Development in Joining**, NSF-Greenfield Coalition, \$49,000, 2002-03.
10. **New Course Development in Advanced Mechatronics**, NSF-CCLI, \$174,000, '03-'05 (with Dr. Sandra Yost and Dr. Mohan Krishnan).
11. **UDM Multi-Disciplinary Student Project Development Advanced Prototyping and Electronic Sensing Systems**, DENSO North American Foundation, \$50,000, 2011.
12. **Ford Capital Equipment Grant**, \$50000, 2012, for renovation of the Automotive laboratory.
13. **Ford Capital Equipment Grant**, \$25000, 2015, for renovation of the INSPIRE laboratory.
14. **S-STEM: Scholarships for Robotics and Mechatronics Systems Engineering**, NSF-SSTEM, \$ 590,000, 2015.

Consulting

Weld Solidification Model Development, Concurrent Technologies Corporation, Johnstown, PA. (Sept. 1994-Dec. 1996).

Aarbor Pressure Predictions, Hydralock Corporation, Mt. Clemens, MI (several occasions since 2003)

Teaching Experience

SAE courses for professionals

Modeling and Simulation of Mechatronic Systems, 2-day course, 4 times

E-Machines for E-Drives, 6 hr. course (part of a week-long Hybrid Academy), 5 times.

Undergraduate

Introductory Mathematics for Engineers (Lecture)- 4 hrs. per week, 5 semesters

Mechanics of Deformable Bodies (Lecture) - 3 hrs. per week, 21 semesters

Mechanics of Deformable Bodies (Laboratory) - 3 hrs. per week, 20 semesters

Mechanical Engineering Design I - 3 hrs. per week, 6 semesters

Mechanical Engineering Design II - 3 hrs. per week, 3 semesters

Computer Aided Design (CAD) - 3 hrs. per week, 7 semesters

Advanced Metal Forming - 3 hrs. per week, 1 semester

Measurements Laboratory (co-taught) - 6 hrs. per week, 1 semester

Freshman Engr. Design – 3 hrs per week, 3 semesters

Joining Techniques – 3 hrs per week, 2 semester

Introduction to Mechatronics - 3 hrs. per week, 5 semesters

Modeling and Simulation of Mechatronic Systems-3 hrs. per week, 13 semesters

Finite Element Method - 3 hrs. per week, 7 semesters

Graduate

Finite Element Method - 3 hrs. per week, 6 semesters

Advanced Finite Elements – 3 hrs. per week, 2 semesters

Electric Drives and Electro-Mechanical Energy Conversion, 3 hrs. per week, 7 semesters.

Computer Aided Design (CAD) - 3 hrs. per week, 7 semesters

Introduction to Mechatronics - 3 hrs. per week, 5 semesters

Composite Material Design - 3 hrs. per week, 1 semester

Mechatronic Product Development - 3hrs. per week, 2 semester

Case Studies in Engineering Design- 3 hrs per week, 1 semester

Modeling and Simulation of Mechatronic Systems-3 hrs. per week, 13 semesters

Refresher Course for Professional Engineer

Taught a 4 hr. refresher course on ME Design (organized by Engineering Society of Detroit) to the engineers preparing to sit for the professional engineering exam (4 times).

Student Mentoring

Doctoral Dissertations Advised:

- ***Finite Element Modeling of High Speed Machining to Predict Tool Wear***, January 1995(co-advisor), student: Philip Akinyemi.
- ***Modeling and experimental verification of the laser forming process***, May 1995, student: Kennedy Odumodu.
- ***Practical Numerical Analysis of a Crack Near a Weld Subjected to Primary Loading and Hydrogen Embrittlement***, December 2003, student: Ayman Askari.
- ***Finite Element Simulation of Warm Forming Assisted Sheet Metal Bending***, May 2006, student: Ricardo Espinosa.

- ***Formation of Thermal Residual Stresses (TRSs) in Functionally Graded Materials (FGMs): A comprehensive study using the Ni-Al₂O₃ system***, May 2016, student: Farag Ali Khouja

Master's Theses Advised:

- ***Fuel Economy: A Fuzzy Logic Based Prediction Tool***, December 2001, student: Robert Sommerton.
- ***Vehicle Rollover Control using Magnetorheological Dampers***, August 2005, student: Arif Baig
- ***Modeling of Variable Force Actuators for Automotive Applications***, August 2007, student: Abhishek Kedia.
- ***Modeling of Thermo-mechanically actuated MEMS***, August 2007, student: Srinivas Chandrasekharan.
- ***Bondgraph based modeling of a CNC Drive***, May 2007, student: Pariksha Tomar.
- ***The parametric thermodynamic cycle analysis of a dual-spool, mixture exhaust turbofan engine***, October 2018, student: Jia Qi Wen.

Master's Capstone Design Advised:

- ***Adhesive Joints: A model based study***, August 2007 student: Nagarjuna Yagam.
- ***Reducing Conducted Transients in Automotive Windshield Wiper Motors***, August 2004, student: Robert Langdorf.
- ***Dynamic Modeling of a Hydraulic Power Steering System***, April 2003, student: Mohammad Akteruzzaman.

Publications and Presentations

Technical Area: Mechatronics

1. M. Krishnan, S. Das, S. A. Yost, "Team-Oriented, Project-Based Instruction in a New Mechatronics Course," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 13d4/1-13d4/6.
2. S. Das, S. A. Yost, M. Krishnan, "Effective Use of Web-Based Communication Tools in a Team -Oriented, Project-Based, Multidisciplinary Course," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp.13a2/14-13a2/17.
3. S. A. Yost, M. Krishnan, S. Das, "Mechatronics: A Comprehensive, Interdisciplinary Curriculum Development Initiative," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 13a1/1-13a1/1.
4. J. M. Weaver, S. Das, "Overhaul of an Undergraduate Mechanical Measurements Laboratory," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 12d3/10-12d3/16.
5. L. Carlson, S. A. Yost, M. Krishnan, S. Das, "Outcomes-Based Assessment for Comprehensive Curriculum Development in Mechatronics," presented at the

Frontiers in Education Conference (FIE'00), Kansas City, Mo, Oct 19-21, 2000, pp. t4a/1-t4a/5.

6. S. Das, M. Krishnan, S. A. Yost, "Mechatronics: A Comprehensive Interdisciplinary Curriculum Development Initiative," NSF Showcase presentation at the Frontiers in Education Conference (FIE'00), Kansas City, Mo, Oct 19-21, 2000 (poster only).
7. S. Das, M. Krishnan, S. A. Yost, "Advanced Mechatronics: Development of Two New Courses", NSF Grantees Conference 2005, February 16-18, 2005, Washington D.C.
8. S. Das, M. Krishnan, S. A. Yost, K. Zimmerman-Oster, "Advanced Mechatronics: Development of a Course on Modeling and Simulation of Mechatronic Systems", ASEE 2005, June 12-16, 2005, Portland Oregon.
9. S. Das, M. Krishnan, S.A. Yost, "The Outgrowth of Mechatronics Curriculum Development Efforts: An Undergraduate Concentration in Mechatronics", Frontiers in Education Conference (FIE'05), Indianapolis, IN, October, 2005.
10. M. Krishnan, S. Das, S. A. Yost, K. Zimmerman-Oster, "Advanced Mechatronics: Development of a Course on Sensors & Actuators for Mechatronic Systems", ASEE 2006, June 18-21, 2006, Chicago, IL.
11. A. Baig, I. Mahmood, S.Das, "Modeling of MEMS Devices for Automotive Applications," **paper 2005-01-1447, SAE 2005.**
12. S. Das, A. Baig, C. Naidu, "Benchmarking Software Tools for Mechatronic Applications," **paper 2005-01-1310, SAE 2005.**
13. R. Langdorf, S. Das, M. Krishnan, "Reducing Conducted Transients in Automotive Windshield Wiper Motors", **paper 2006-01-0297, SAE 2006.**
14. M. Krishnan, S. Das, S. A. Yost, K. Zimmerman-Oster, "A Mechatronics Curriculum Development Initiative: Relevance, Content, and Results from an 8-Year Effort," 5th Annual Conference on Engineering for the Americas, Rio De Janerio, Brazil, October 2006.
15. P. Tomar, S.Das, "Bond Graph Modeling and Simulation of a Closed-Loop Feed Drive System for a CNC Machine," **paper 2007- 01-1637, SAE 2007.**
16. Shuvra Das, Sandra A. Yost, Mohan Krishnan, "A Ten-Year Mechatronics Curriculum Development Initiative: Relevance, Content, and Results - Part I," **IEEE Transactions on Education in May 2010, 194-201, 53 (2), 2010.**
17. Mohan Krishnan, Shuvra Das, Sandra A. Yost, "A Ten-Year Mechatronics Curriculum Development Initiative: Relevance, Content, and Results - Part II," **IEEE**

Transactions on Education in May 2010, 202-208, 53(2), 2010.

18. Shuvra Das, Leo E. Hanifin, Sean Newell, A New Responsive Model for Educational Programs for Industry: The University of Detroit Mercy Advanced Electric Vehicle Graduate Certificate Program, **paper 2010-01-2303**. SAE Convergence 2010.
19. Shuvra Das, Leo E. Hanifin, Sean Newell, "A New Responsive Model for Educational Programs for Industry: The University of Detroit Mercy Advanced Electric Vehicle Graduate Certificate Program," **SAE International Journal of Passenger Cars- Electronic and Electrical Systems**, 3(2), pp 10-18, Dec. 2010.

Technical Area: Computational Mechanics

20. A. K. Mitra and S. Das, "Nonuniqueness in the Integral Equation Formulation of the Biharmonic Equation in Multiply Connected Domains," **Computer Methods in Applied Mechanics and Engineering**, Vol. 69, pp. 205-213, 1988.
21. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Laplace Problems and its Application in Flaw Identification in Materials," **Journal of Computational Physics**, 99, 1992, pp. 99-106.
22. S. Das and A. K. Mitra, "Use of Boundary Element Method for the Determination of Tool Shape in Electro-Chemical Machining," **International Journal for Numerical Methods in Engineering**, 35(5), 1992, pp.1045-1055.
23. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Laplace Problems using BEM," presented at the 21st. Midwestern Mechanics Conference, Houghton, MI, Developments in Mechanics (Ligon, et. al. eds.), Mich. Tech. Univ., Aug. 1989, pp.525-526.
24. A. K. Mitra and S. Das, "Solution of Inverse Problems Using Boundary Element Method," BETECH '92, Albuquerque, New Mexico (C. A. Brebbia and M. S. Ingber, eds.), Computational Mechanics publ., June 1992, pp. 721-731.
25. S. Das and A. K. Mitra, "An Algorithm for the Solution of Inverse Heat Conduction Problem using Boundary Element Method," presented at the Annual Meeting of the Society of Engineering Science, Santa Fe, NM, Oct. 1990.
26. S. Das, "Solving Groundwater Problems using Boundary Elements," presented at the 100th. Annual meeting of Iowa Academy of Science, Ames, Iowa, April 1988.
27. N. Yagam and S. Das, "Finite Element Modeling of Adhesive Joint Behavior for Automotive Applications", **paper 6M-36, SAE 2006**.

Technical Area: Manufacturing Process Modeling

28. S. Das and A. J. Paul, "Determination of Interfacial Heat Transfer Coefficient in Casting and Quenching Using a Solution Technique for Inverse Problems Based on the Boundary Element Method," **Metallurgical Transactions B**, Vol. 24B, Dec.1993, pp. 1077-1088.
29. G. K. Upadhyaya, S. Das, U. Chandra and A. J. Paul, "Modeling the Investment Casting Process: A Novel Approach for View Factor Calculations and Defect Prediction," **Applied Mathematical Modeling**, Vol. 19, June 1995, pp.354-362.
30. S. Das, V. K. Suri, U. Chandra and K. Sampath, "A One Dimensional Mathematical Model for Selecting Plasma Spray Process Parameters," **Journal of Thermal Spray Technology**, Vol. 4 (2), June 1995, pp. 153-165.
31. K.Odumudu and S.Das, "A Numerical and Experimental Study of Forceless Forming Using Lasers," **Computer Modeling and Simulation in Engineering**, Vol 2, August 1997, pp.243-266.
32. S. Das, M. Klotz, and F. Klocke, "EDM Simulation: Finite Element Based Calculation of Deformation, Micro-structure and Residual Stresses", **Journal of Material Processing Technology**, Vol 142, Nov 2003, pp. 434-451.
33. S. Das, G. Antonoglou, and F. Klocke, "Simulation of Fluid Flow in the Vicinity of the Electrode and the Workpiece in the Wire-EDM Process", submitted to **Journal of Material Processing Technology** for publication.
34. A. Askari, S. Das, "Practical Numerical Analysis of a Crack Near A Weld Subjected To Primary Loading And Hydrogen Embrittlement", **Journal of Material Processing Technology**, Vol. 173, March 2006, 1-13.
35. S. Das, S. Paolucci and M. Sen, "The Minimization of the Solidification Time of a Thin Cylindrical Shell, presented at ASME Winter Annual Meeting, Fundamentals of Phase Change: Freezing, Melting and Sublimation, ASME HTD, V. 215, pp. 79-87, Nov. 8-13, 1992.
36. S. Das, G. Upadhyaya, U. Chandra, M. J. Kleinosky and M. L. Tims, "Finite Element Modeling of Single-Pass GMA Weldment," Modeling of Casting, Welding and Advanced Solidification Processes VI, T. S. Piwonka, V. Voller and L. Katgerman, eds., TMS, Palm Coast, FL, March 21-23, 1993, pp.593-600.
37. S. Das, D. K. Moyer, M. L. Tims, G. Upadhyaya and M. J. Kleinosky, "Modeling Heat Transfer, Microstructure Development, Transformation Plasticity and Residual Stresses in GMA Multi-Pass Butt Welds," presented at International Conference on Modeling and Control of Joining Processes, Miami, FL, December 8-10, 1993, Orlando, FL, edited by T. Zacharia, American Welding Society, Miami, FL, 1994 (published in proceedings, 8 pages).

38. S. Das and A. J. Paul, "Determination of Interfacial Heat Transfer Coefficient in Castings Using a Solution Technique for Inverse Problems Based on the Boundary Element Method, "Modeling of Casting, Welding and Advanced Solidification Processes VI, T. S. Piwonka, V. Voller and L. Katgerman, eds., TMS, Palm Coast, FL, March 21-23, 1993, pp.647-654.
39. S. Das, G. Upadhyaya and U. Chandra, "Prediction of Macro- and Micro-Residual Stress in Quenching Using Phase Transformation Kinetics," Quenching and Control of Distortion, G. Totten, ed., ASM, Chicago, Illinois, 1992, p.229-234.
40. S. Das, V. K. Suri, U. Chandra and K. Sampath, "A One Dimensional Mathematical Model for Selecting Plasma Spray Process Parameters," presented at the National Thermal Spray Conference, June 20-24, 1994.
41. S. Das, G. Upadhyaya and A. J. Paul, "A Geometric Approach to Optimized Riser Design in Castings," presented at the TMS Annual Meeting, Feb. 26-March 3, 1994. (paper published in proceedings, 11 pages).
42. D.K. Moyer, R.E.Smelser, M.J.Kleinosky, S.Das, "The Effect of Bead Lumping Strategies on Residual Stress Prediction in GMA Multi-Pass Welds," ASM-TMS Materials Week, Oct 2-6, 1994, Rosemont,IL.
43. S. Das, V. Ramnarayan, K. G. Anand and K. C. Wang, "Prediction of Wrinkling during the HIP consolidation of b1S Ti/Si Cf Composite Panels, presented at the TMS Annual Meeting, Feb. 26-March 3, 1994 (paper published in proceedings, 8 pages).
44. G. K. Upadhyaya, S. Das, U. Chandra and A. J. Paul, "Geometric Methods for Simulating Solidification Heat Transfer in Casting Processes," presented at the 1994 ASME Thermophysics and Heat Transfer Conference, ASME Current developments in Numerical Simulation of Flow and Heat Transfer, ASME HTD, v.275, pp. 43-56, June 20-23, 1994.
45. K. Odumodu and S.Das, "Laser Shaping: A Numerical and Experimental Study," presented at the 32nd. Annual Conference of Society of Engineering Science, pp. 405-406, Oct.29-Nov. 2, 1995.
46. K. Odumodu and S.Das, "Forceless Forming using Laser," presented at the ASME winter Annual Meeting, Advanced Materials: Development and Characterization, Processing and Mechanical Behavior, ASME publ., pp. 169-170, November 1996, Atlanta, GA.
47. P. Akinyemi, Y.S. Chadda, and, S.Das, "A Finite Element Model to Predict Heat Generation and Tool Life in 3-D Oblique Cutting," presented at the 33nd. Annual Conference of Society of Engineering Science, Oct.1996 (paper published in proceedings, 8 pages).

48. U. Chandra, G.K. Upadhyaya, S. Das, and M.N. Davis, "Simplified Models for Simulation of Heat Treating Processes," presentation, 21st ASM Heat Treating Society Conference, Indianapolis, IN, November 2001.
49. S. Das, "On Modeling Multi-pass Welding: Prediction of Residual Stresses and Microstructures," second International Conference on Theoretical, Applied, Computational and Experimental Mechanics (ICTACEM 2001) Kharagpur, India, Dec. 27-30,2001, paper 110 (pp. 1-12), electronic proceedings published.
50. S. Das, "Enabling Agility in a Changing Automotive Environment: Mechanics to Mechatronics, A Perspective on Simulation," International Conference on Agile Manufacturing (ICAM2006), July 19-20, 2006, Norfolk, VA.
51. R. H. Espinosa, S. Das, J. Weaver, "Simulation of Warm Forming Assisted Hemming to Study the Effect of Process Parameters on Product Quality, **paper 07M-230, SAE 2007.**
52. Geo Joy, Shuvra Das, Nassif Rayess, "MacPherson Suspension: Modeling, Simulation, and Validation," **paper 19SS-0277, SAE 2019 (in review).**

Technical Area: Curriculum Development and ABET

53. S. Das, "Modernization of Material Testing Laboratory Curriculum," presented at the Frontiers in Education Conference (FIE'99), San Juan, Puerto Rico, Nov. 1999, pp. 12d3/17-12d3/22.
54. M. Schumack, M. Vaksman, S. Das, K. Belfield, M. Ssemakula, R. Pryor, V. Sheyman, and W. W. Schultz,"Thermophysics for Manufacturing Engineers: A Nontraditional Approach," 1997 ASEE Annual Conference Proceedings, 11 p., 1997.
55. S. Das, M. Schumack, M. Vaksman, K. Belfield,"Development and Implementation of the Thermophysics Knowledge Area for the Greenfield Coalition for New Manufacturing Engineering Education," International Conference on Engineering Education (eds. D. Throgmorton, J. Evers, J. Mead, and M. Kulkarni), College of Engr., Southern Illinois University at Carbondale, Aug. 13-15,1997,Chicago, IL, pp. 466-477.
56. Dan Budny, Mohan Krishnan, Shuvra Das, and Mark Paulik, Ronald R. DeLyser, Hamid Khan, Donald Elger, Charles F. Yokomoto, James Rowland, Mitchell Litt, and Donald Carpenter "Assessment: When is Enough, Enough?", paper for special session on ABET and assessment at FIE-2003, Boulder, CO, Nov 2003.
57. Shuvra Das, "Implementing a Multi-Media Case Study in a Traditional Laboratory Class," ASEE 2006, June 18-21, 2006, Chicago, IL.

58. S. Das, "Implementing the Wright State Model for Engineering Mathematics at University of Detroit Mercy," to be presented at International Mechanical Engineering Congress and Exposition, Nov. 9-15, 2018, Pittsburgh, PA.

Invited Presentations

59. S. Das, "Modeling of Gas Metal Arc Welding." at Army Tank Command (TACOM) in Warren, MI. (July, 1994).
60. S. Das, "Inverse Problems and Their Solutions Using BEM," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
61. S. Das, "Use of FEA in Modeling Manufacturing Processes: Welding and Metal Cutting," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
62. S. Das, "Use of Fuzzy Logic in Solving Engineering Problems," at a short workshop for graduate students and industry professionals, Michigan State University, East Lansing, MI, June 13-14, 2000.
63. S. Das, "X-by-wire in Automotive Industry and its Impact on Curriculum and Research," Indian Institute of Science, Bangalore, India, January 3, 2006.
64. S. Das, "Simulating Engineering Systems Using Bond Graphs," Michigan Simulation Users Group meeting, June 19, 2007.

Project Report to Sponsor

65. S. Das, S. Paolucci and M. Sen, "Solidification of Metals in Die-Casting," Report submitted to sponsor upon completion of Phase I of the project, University of Notre Dame, Sept. 1991, 78 pages.
66. S. Das, "Capacitor Discharge Welding", Report submitted to Ford Motor Company upon completion of a funded project, May 1996.

Book Chapter

67. S. Das and U. Chandra, "Residual Stress and Distortion," Chapter 6 in **Handbook of Aluminum: Vol I, Physical Metallurgy and Processes**, G. E. Totten and D. S. Mackenzie (eds.), Marcel Dekker, Inc., New York, NY (2003) pp.305-350.
68. S. Das, P. Goswami, D. Chakraborty, "The managerial technical investment decision making process, in light of the disruptive impact of Internet of Things (IoT) technology," Automation Alley, **Technology in Industry 4.0 Report**, 2019 (in preparation).

Books

69. Nader Zamani and Shuvra Das, “**ABAQUS for Catia V5: Tutorials**,” SDC Publications, Nov. 2006.
70. Nader Zamani and Shuvra Das, “**ABAQUS for Catia V5 Tutorials: AFC 2.5**,” SDC Publications, APR. 2008.
71. Shuvra Das, “**Mechantronic Modeling and Simulation Using Bondgraphs**,” CRC Press, Mar. 2009.
72. Shuvra Das, “**Modeling and Simulation of Mechatronic Systems Using SimScape**,” Morgan & Claypool Publishers, 2019 (manuscript in preparation).

Affiliations

ASME, Tau Beta Pi, Sigma Xi, ASM, SME, ASNT, ASEE

Outreach and Service Activities

- Made presentations on Engineering as a Career to many High School classes during high school career days (Holy Redeemer, Brother Rice, Southfield High School, Detroit Mayor’s Conference for Youth).
- Taught CAD classes to female high school students as part of the “Women’s Summer Design Institute” program at UDMercy, 1999-2001.
- Taught Mechatronics classes to visiting high school students as part of the “College Class for a Day” program at UDMercy 1999-2001.
- Advisor to the local ASME student section, 1998-2004.
- Served on several college and university committees at UDM such as FGIP, Bookstore, and several departmental committees.
- Organized and hosted the ASME Region V ME Department Head’s meeting at UDM, May 2003
- On several occasions, provided free engineering consulting services to local industries.
- Served on the college ad-hoc committee for Promotion and Tenure 2013-2016.
- Served on the College Co-op advisory committee, 2009-2016.
- Served on the Advisory Committee for OSPRA, 2009 - present
- Subcommittee chair for Criteria 5 on the Higher Learning Commission Accreditation self-study committee.
- Chief Faculty marshal on the Commencement Committee, 2014-2017.
- Served on the University Research Day Committee 2012-2016
- Served on College FGIP (Faculty Grant Incentive program) committee 1998-‘05.
- Served on the University tenure and promotion committee (2005-2009).
- Served on the College tenure and promotion committee (2004-2005), (2016-2017).
- Faculty Advisor for Engineering Honor Society, TBP (2013-present).

- Served on the College Technology Discovery Day committee for 3 years 1998-2000.
- Served as chairperson of the Mechanical Engineering Department 2002-2003.
- Served on the college ABET committee 2002-2003.
- Served on the College leadership committee 2002-2003, 2009-2015.
- Served on departmental sub-committees for Design and Manufacturing 2002-present.
- Served on several departmental faculty search committees.
- Occasional fill-in for ME Chair during his absence.

Other Professional Activities

- **Co-chaired** a technical session on the role of mechanics in materials processing and manufacturing processes at the 32nd. Annual meeting of the Society of Engineering Science (Oct.,1995, New Orleans, LA).
- **Co-chaired** a technical session on the role of mechanics in materials processing and manufacturing processes at the 33nd. Annual meeting of the Society of Engineering Science. (Oct.,1996, Tempe, AZ).
- **Participated** in a NSF funded workshop on Concurrent Engineering: 3-D Modeling, Analysis and Manufacturing, University of Texas, Austin (August 1996, Austin, TX)
- **Participated** in a NSF funded workshop on Learner Centered, Project-Based Workshop on Collaborative Learning, University of Notre Dame, Notre Dame (July 1997, Notre Dame, IN).
- **Participated** in a NSF funded workshop on Using Case Studies in the Teaching of Engineering, Auburn University, Sept 27-29, 2001 (Auburn, AL).
- **Organized and Hosted** the ASME Region V ME Department Head's meeting at UDM, May 2003.
- **Participated** in a NSF funded workshop on Using Case Studies in the Teaching of Engineering, Auburn University, Sept., 2005 (Auburn, AL).
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2006.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2007.
- **Chaired** a session on Automotive Systems at the International Conference on Agile Manufacturing (ICAM 2006), July 19-20, 2006, Norfolk, VA.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2008.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session AE15) at SAE 2009.
- **Co-organized** a session on Mechatronics Modeling and Simulation (Session SAE201) at SAE 2010.
- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in October 2009.
- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in April 2010.

- **Taught** a 2-day course on Mechatronics: Introduction, Modeling and Simulation in October 2010.

References

- Dr. Michael Jenkins, Professor and Chair, Mechanical Engineering Department, University of Detroit Mercy, 4001 W. McNichols Road, Detroit 48219, USA, (313) 993-1242, fax: 313-993-1187, jenkinsm@udmercy.edu.
- Dr. N. Mohankrishnan, Professor, Electrical Engineering Department, University of Detroit Mercy, 4001 W. McNichols Road, Detroit 48219, USA, (313) 993-3367, fax: 313-993-1187, mohank@udmercy.edu.
- Dr. Tim Taylor, Staff Engineer, Advanced Mechanical Design, GE Transportation, Aircraft Engines, (513) 243-6946, (513) 243-2869 FAX, timothy.w.taylor@ae.ge.com
- Dr. Ambar K. Mitra, Associate Prof. Aerospace Engineering and Engineering Mechanics, Iowa State University, Ames, IA 50011, (515) 294-2694, USA, akmitra@iastate.edu.
- Dr. Yogendra S. Chadda, Professor and former Chair (retired), Mechanical Engineering Department, University of Detroit Mercy, 214 W. Thomas Ct Middletown, DE 19709-6850, 302-449-2023.
- Dr. Gary Kuleck, Provost and Academic Vice President, Oregon Technological University, 541-885-1663, gary.kuleck@oit.edu.

Outlines of proposed courses for a week-long teaching stint at Veltech

Shuvra Das
Professor of Mechanical Engineering
University of Detroit Mercy
Detroit, MI 48221

Introduction to Electric and Hybrid Electric Vehicles

There is a world-wide push to transform automobile technologies from traditional fossil-fuel based to one that is based on electric drives. Thus, companies have launched Electric (EV) and Hybrid Electric vehicles (AEV). These vehicles are more fuel-efficient and environmentally friendly compared to conventional vehicles. Optimizing the power intake in EVs allows the vehicles operation to be kept within the range designed for best fuel economy and lowest emission, while the motor/generator system either provides additional power input, generates electricity using the excessive power from the engine. In the case of hybrid electric vehicles (HEVs) the motor/generators system also recovers the kinetic energy during braking or coasting. During braking or coasting, it is also possible to recover kinetic energy for a battery electric vehicle by introducing additional generator/s mounted either in the hub or in the axle of the vehicle. These advantages have attracted worldwide development interests for such vehicles. It has also created a need for many automotive engineers to learn about these systems as they contribute to their design and manufacture.

The challenges and emerging technologies present in electric and hybrid electric vehicles include power electronics, electric motors and generators, batteries, power management, thermal management, and system integration.

This course will provide an overview and fundamentals of AEVs (HEV, EV, BEV) and key challenges and opportunities of AEV technologies. The course will explain the engineering philosophy of various AEVs (HEV, PHEV and BEV). It will also give an overview of electric drives, power electronics, regenerative braking system, power management, and battery management. Sample problems involving modeling and simulation using Matlab-Simulink will be explored and discussed to cover some of the above topic areas with a view to making design decisions in terms of size and performance. Some existing commercial HEV architecture will be discussed.

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VC



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R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Details of Professor & Course:

Name of the Professor	Prof. Dr. Shuvra Das (Profile Attached)
University & Country	University of Detroit Mercy, Detroit, USA
Title of the Course	Modeling and Simulation of Electric and Hybrid Electric Vehicles (Contents Attached)
Department	Automobile Engineering
Dates of the Course	January 27 to 31, 2020
Total No. of Hours	15
No. of Credits	1
Category	Industry/ Higher Institute Learning
Course Content	Attached

Prepared by:

[Signature]
15/10/19

Coordinator – Directorate of Intl. Relations

Forwarded by:

[Signature]
15/10/19

Director – Directorate of Intl. Relations

HoD

[Signature]
15/10/19
Dr. Amala Justus Selvam
Head of the Department
Automobile Engineering

Dean

Prof. Dr. A. T. Ravichandran
Dean SoMC

Director (Academic)

[Signature]
Prof. Dr. techn. Koteswara Rao Anne
Director Academics

Vice Chancellor

[Signature]
Prof. V. S. S. Kumar
Vice Chancellor

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[Signature]

SNo	Stu_Id	Stu_Name	Stu_Degree	Stu_Branch	Stu_Test_SubjectCode	Stu_Test_SubjectName	Stu_Subject_PassFail	Stu_Grade
1	VtU6826	PATNANA SAI DURGA	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
2	VtU6809	MOHAMED JAMALDEEN P	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
3	VtU6814	RAJKIRAN V	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
4	VtU6817	MYNAMPATI VIJAY REDDY	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
5	VtU6825	MOHAMED ABDUL KADHAR S	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
6	VtU11775	ARUN A	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
7	VtU6821	U PRAVEEN KUMAR	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
8	VtU6793	AKASHRANGAM L R	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
9	VtU11696	ABDUL RAHMAN A R	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
10	VtU11336	AKASH L	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
11	VtU11615	MOHAMMED LUKMAAN H	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
12	VtU11378	JOHNSON J	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
13	VtU8323	LAKSHMI GANESH R	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
14	VtU11151	KISHORE KANNA S	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
15	VtU9253	ABHISHEK MAZUMDAR	B.Tech	Automobile-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
16	VtU6734	VAJJA VEERANJANEYULU	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
17	VtU6743	YERRAMALA SAI LIKHITH GOWD	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
18	VtU6740	VASANTHAVADA BALAJI	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	NE	NE
19	VtU6770	DODDARAPU SREE TEJA	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
20	VtU6752	DARA AASA	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
21	VtU6756	MOHAMMAD NASIR AKHTAR	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
22	VtU6757	POTNURU ALEKYA	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
23	VtU6772	RAJVEER G V	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
24	VtU6773	KONDURU THULASI RAM	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
25	VtU6760	YUVAJA K	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
26	VtU6761	SATTARU JAGADEESH	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
27	VtU6864	KEERTHIKA R M	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
28	VtU7733	AKHILA R	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
29	VtU7819	PINNINTI PRANEETH KUMAR	B.Tech	Aeronautical-Eng	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
30	VtU12877	AAREDLA RAVITEJA REDDY	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
31	VtU14761	AVULA VAMSHIKRISHNA	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
32	VtU11297	POTLURU MANUSH BABU	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
33	VtU11299	PANDIRI KEDARNATH	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
34	VtU14904	PASUMARTHI VENKATA SUDHAKAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
35	VTU10988	NANDYALA HARSHA DURGA SIVA SAI KUMAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
36	VtU10309	MD TABISH KHAN	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	NE	NE
37	VtU14267	KOTTURI HAVEERDCHAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
38	VTU11037	K.JAGADEESHWAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
39	VTU11043	KANCHARLA TARUN SATYA NAGA KUMAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
40	VtU14725	GODAVARTHI TARUN KUMAR	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
41	VtU11238	KUMARAN S	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	A
42	VtU11397	UDDANDAM SUBRAMANYAM	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
43	VtU14561	JOEL M DEVASIA	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
44	VtU14553	MURALA LOKESH	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
45	VtU12803	ABDUL AFREED	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S

SNo	Stu_Id	Stu_Name	Stu_Degree	Stu_Branch	Stu_Test_SubjectCode	Stu_Test_SubjectName	Stu_Subject_PassFail	Stu_Grade
46	VtU14588	JOYFEBIN	B.Tech	MECHANICAL	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
47	VtU12906	B SUSHANTH REDDY	B.Tech	MECHANICAL(AUTO)	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
48	VtU12920	MUTHIREDDY ANVESH	B.Tech	MECHANICAL(AUTO)	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S
49	VtU14184	UPPALAPATI VAMSI GOPI KRISHNA	B.Tech	MECHANICAL(AUTO)	1157AU907	Modeling and Simulation of Electric and Hybrid Electric Vehicles	Pass	S



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Our Ref. No: 2019-2020/ VF 196 & 197

Your Ref. No:

Submitted for the Approval:

Name of the Professor: Prof. Dr. Shuvra Das

University & Country : University of Detroit Mercy, USA

Course Titles : 1. Modeling and simulation of Mechatronics Systems (15Hrs) ✓
2. Modeling and simulation of Electric and Hybrid Electric vehicles ✓
(15 Hrs)

Department : 1. Mechanical Engineering ✓
2. Automobile Engineering ✓

Participants : Course 1: 45 students ✓
Course 2: 50 Students ✓

Program date : January 27 to 31, 2020

Sl. No	Description	Amount in INR
1	Course Honorarium (Rs.3000 * 30Hrs) (Net Amount & Tax Free)	90,000 ✓
	Total	90,000

(Rupees Ninety thousand only)

In this regard, I request your approval for transferring the amount in INR to the following Account,

Name: Shuvra Das & Sunil Kumar Das

Account No: 11960100054727

Bank: Federal Bank

IFSC code: FDRL0001196

PAN No: ADNPD6776C

Entered in Budget Register

Pg. 11, Sl. 45

Thank You,

S. Sivaperumal



Signature
04/02/2020

Delegates Visited :

1. Prof. Dr. Mohan Krishnan (Professor - Electrical and Computer Engineering, College of Engineering & Science)
2. Prof. Shurva Das (Professor – Mechanical Engineering, Director - International Programs in E&S)

University & Country : University of Detroit Mercy, USA

Date Visited : 24.07.2019

Purpose: Prof. Dr. Mohan Krishnan, Professor - Electrical and Computer Engineering, College of Engineering & Science and Prof. Shurva Das, Professor – Mechanical Engineering, Director - International Programs in E&S from University of Detroit Mercy, USA visited Vel Tech on 24th July, 2019 to discuss the ways to be implemented upon collaboration and to explore the potential possibilities of research in areas of mutual interest. Prof. Shurva Das also gave his interest towards offering the course to Mechanical Engineering Department.

