Swaprava Nath

Computer Science and Engineering
Indian Institute of Technology Kanpur
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Research Interests

Artificial intelligence, multi agent systems, game theory, mechanism design, computational social choice, crowdsourcing, social networks.

Academic Employment

- Assistant Professor *2017 - till date*
  Department of Computer Science and Engineering
  Indian Institute of Technology, Kanpur, India
- Fulbright-Nehru Post Doctoral Fellow *2015 - 2017*
  Computer Science Department
  Carnegie Mellon University, Pittsburgh, USA
  Host: Dr. Ariel Procaccia
  Research: *Computational Social Choice*
- Lecturer and Post Doctoral Fellow *2013 - 2015*
  Economics and Planning Unit
  Indian Statistical Institute, New Delhi, India
  Host: Prof. Arunava Sen
  Research: *Mechanism Design Theory*

Education

- Doctor of Philosophy (Ph.D.) in Computer Science *2009 - 2013*
  Indian Institute of Science, Bangalore, India
  Research: *Mechanism Design for Strategic Crowdsourcing*
  Thesis Supervisor: Prof. Y. Narahari
- Master of Engineering (M.E.) in Telecommunication *2006 - 2008*
  Indian Institute of Science, Bangalore, India
  Research: *Self Organization in Wireless Sensor Networks*
  Research Supervisor: Prof. Anurag Kumar
- Bachelor of Engineering (B.E.) in Electronics & Telecommunication *2002 - 2006*
  Jadavpur University, Kolkata, India
  Final year project: *Analysis of Time Modulated Linear Antenna Array*
  Project Supervisor: Prof. Bhaskar Gupta

Industry Experience

- Research intern at **Xerox Research Centre Europe**, Grenoble, France. *June - August, 2010*
- Software engineer in **Cisco Systems (India) Private Limited**. *August 2008 - July 2009*

Awards and Achievements

- **Senate commendation** for *teaching excellence* in the course "CS711: Introduction to Game Theory and Mechanism Design" taught in the 2020-21-I semester, IIT Kanpur.

- Our solution *Satyanweshi*, a truth-seeking chatbot, secured **the second place in MHRD AICTE Samadhan online challenge** in response to COVID-19: `https://mic.gov.in/hackathon/samadhan` among more than 2500 participants, 2020.
- **Fulbright-Nehru Postdoctoral Fellowship** for research in Internet Economics, 2015.
- **Honorable Mention Award** in Yahoo! Key Scientific Challenges Program, 2012.
- **Tata Consultancy Services PhD Fellowship** for 2010.
- **Intern Day Prize** for the presentation on Intern Day, August 30, 2010, at Xerox Research Centre Europe, Grenoble, France.
- Graduate Aptitude Test in Engineering (GATE, Entrance test for graduate studies in engineering) 2006: **All India Rank 34** out of approximately 40,000 candidates in Electronics and Communication stream.
- **Bronze medal** for securing the second highest aggregate of marks among all the courses of the Bachelor of Engineering examination 2006, Jadavpur University, Kolkata, India, out of approximately 800 students in 13 departments.

Publications*

**Impact factor and acceptance rate statistics courtesy: DBLP, CiteSeerX, RePEc (for economics), and corresponding conference organizations.*

Working Paper(s):

[W5] Aasheesh Dixit*, Garima Shakya*, Suresh Kumar Jakhar, and **Swaprava Nath** (*equal contribution), "*Egalitarian and Congestion Aware Truthful Airport Slot Allocation Mechanism*", Technical Report, 2020.

[W4] Ankur Gupta*, Yash Varun*, Prarthana Das*, Nithya Muttineni*, Parth Srivastava*, Hamim Zafar, **Swaprava Nath**, and Tanmoy Chakraborty (*equal contribution), "*TruthBot: An Automated Conversational Tool for Intent Learning, Curated Information Presenting, and Fake News Alerting*", Technical Report, 2020.

[W3] Deepesh Kumar Lall*, Garima Shakya*, and **Swaprava Nath** (*equal contribution), "*Prior-free Strategic Multiagent Scheduling with focus on Social Distancing*", Technical Report, 2020.

[W2] Anujit Chakraborty, Jatin Jindal, and **Swaprava Nath**, "*Incentivizing Effort and Precision in Peer Grading*", Technical Report, 2020.

[W1] Ioannis Caragiannis, Aris Filos-Ratsikas, **Swaprava Nath**, and Alexandros A. Voudouris, "*Truthful ownership transfer with expert advice: Blending mechanism design with and without money*". Technical Report, 2020.

Journals:

[J8] Gerdus Benade, **Swaprava Nath**, Ariel Procaccia, and Nisarg Shah, "*Preference Elicitation For Participatory Budgeting*". In **Management Science (MS)**, Forthcoming 2020.

[J7] **Swaprava Nath** and Tuomas Sandholm, "*Efficiency and Budget Balance in General Quasi-linear Domains*". In **Games and Economic Behavior (GEB)**, Volume 113, 2019, pp. 673-693. **Impact factor: 1.251**

[J6] Debasis Mishra, **Swaprava Nath**, and Souvik Roy, "*Separability and Decomposition in Mechanism Design with Transfers*". In **Games and Economic Behavior (GEB)**, Volume 109, 2018, pp 240-261. **Impact factor: 1.251**

[J5] Ioannis Caragiannis, **Swaprava Nath**, Ariel Procaccia, and Nisarg Shah, "*Subset Selection Via Implicit Utilitarian Voting*". In **Journal of Artificial Intelligence Research (JAIR)**, Volume 58, 2017, pp 123-152. **Impact factor: 1.691**

[J4] **Swaprava Nath**, Onno Zoeter, Y. Narahari, and Chris Dance, "*Dynamic Mechanism Design with Interdependent Valuations*". In **Review of Economic Design (ROED)**, 19(3), 2015, pp 211-228. **Impact factor: 3.461**

[J3] **Swaprava Nath** and Arunava Sen, "*Affine Maximizers in Domains with Selfish Valuations*". In **ACM Transactions on Economics and Computation (ACM-TEAC)**, 3(4), 2015, article 26, pp 26:1-19. **Impact factor: 1.967**

[J2] **Swaprava Nath** and Onno Zoeter, "*A Strict Ex-post Incentive Compatible Mechanism for Interdependent Valuations*". **Economics Letters**, 121(2), 2013, pp 321-325. **Impact factor: 5.059**

[J1] **Swaprava Nath**, Venkatesan N. E., Anurag Kumar, and P. Vijay Kumar, "*Theory and Algorithms for Hop-Count-Based Localization with Random Geometric Graph Models of Dense Sensor Networks*". In **ACM Transactions on Sensor Networks (ACM-TOSN)**, 8(4), 2012, article 35, pp 35:1-38. **Impact factor: 1.388**

Peer-reviewed Conferences and Workshops:

[C20] Sankar Das, **Swaprava Nath**, and Indranil Saha, "*OMCoRP: An Online Mechanism for Competitive Robot Prioritization*", To appear, **International Conference on Automated Planning and Scheduling (ICAPS)**, 2021.

[C19] Jay Gupta and **Swaprava Nath**, "*SkillCheck: An Incentive-based Certification System using Blockchains*". **IEEE International Conference on Blockchain and Cryptocurrency (ICBC)**, 3-6 May, 2020, Toronto, Canada.

[C18] Somu Prajapati, Ayushi Gupta, Shubham Kumar Nigam, and **Swaprava Nath**, "*SwaGrader: A Honest Effort Extracting, Modular Peer-Grading Tool*". In Proceedings, **ACM IKDD Joint International Conference on Data Science & Management of Data (CoDS-COMAD)**, January 3-5, 2020, Hyderabad, India, pp. 312-316. **Acceptance rate: 31%**

[C17] Palash Dey, Neeldhara Misra, **Swaprava Nath**, and Garima Shakya, "*A Parameterized Perspective on Protecting Elections*". In Proceedings, **International Joint Conference on Artificial Intelligence (IJCAI)**, August 10-16, 2019, Macao, China, pp 238-244. **Acceptance rate: 18%**

[C16] Palash Dey, **Swaprava Nath**, and Garima Shakya, "*Testing Preferential Domains Using Sampling*". In Proceedings, **International Conference on Autonomous Agents and Multiagent Systems (AAMAS)**, May 13-17, 2019, Montreal, Canada, pp 855-863. **Acceptance rate: 25%**

[C15] Palash Dey, Pravesh K. Kothari, and **Swaprava Nath**, "*The Social Network Effect on Surprise in Elections*". In Proceedings, **ACM IKDD Joint International Conference on Data Science & Management of Data (CoDS-COMAD)**, January 3-5, 2019, Kolkata, India, pp. 1–9. [finalist for the best paper] **Acceptance rate: 31%**

[C14] Ioannis Caragiannis, Aris Filos-Ratsikas, **Swaprava Nath**, and Alexandros A. Voudouris, "*Truthful mechanisms for ownership transfer with expert advice*". To appear in **Workshop on Opinion Aggregation, Dynamics, and Elicitation (WADE), In conjunction with ACM Conference on Economics and Computation (EC)**, 2018.

[C13] Stefanos Nikolaidis, **Swaprava Nath**, Ariel Procaccia, and Siddhartha Srinivasa, "*A Game-Theoretic Formalism of Human Partial Adaptation: Models and Experiments*". In Proceedings, **Human Robot Interaction (HRI)**, March 6-9, 2017, Vienna, Austria, pp 323-331. **Acceptance rate: 24%**

[C12] Gerdus Benade, **Swaprava Nath**, Ariel Procaccia, and Nisarg Shah, "*Preference Elicitation For Participatory Budgeting*". In Proceedings, **AAAI Conference on Artificial Intelligence (AAAI)**, February 4-9, 2017, San Francisco, California, USA, pp 376-382. **Acceptance rate: 25%**

[C11] **Swaprava Nath** and Tuomas Sandholm, "*Efficiency and Budget Balance*". In Proceedings, **Web and Internet Economics (WINE)**, December 11-14, 2016, Montreal, Canada, pp 369-383. **Acceptance rate: 24%**

[C10] Ioannis Caragiannis, **Swaprava Nath**, Ariel Procaccia, and Nisarg Shah, "*Subset Selection Via Implicit Utilitarian Voting*". In Proceedings, **International Joint Conference on Artificial Intelligence (IJCAI)**, July 9-15, 2016, New York, USA, pp 151-157. **Acceptance rate: 25%**

[C9] **Swaprava Nath** and Balakrishnan Narayanaswamy, "*Productive Output in Hierarchical Crowdsourcing*". In Proceedings, **Autonomous Agents and Multi-Agent Systems (AAMAS)**, May 5-9, 2014, Paris, France, pp 469-476. **Acceptance rate: 24%**

[C8] Satyanath Bhat, **Swaprava Nath**, Onno Zoeter, Sujit Gujar, Y. Narahari, and Chris Dance, "*A Quality Assuring Mechanism for Crowdsourcing with Strategic Agents*". In Proceedings, **Autonomous Agents and Multi-Agent Systems (AAMAS)**, May 5-9, 2014, Paris, France, pp 917-924. **Acceptance rate: 24%**

[C7] Kundan Kandhway, **Swaprava Nath**, Bhushan Kotnis, Balakrishnan Narayanaswamy, and David C. Parkes, "*On Profit Sharing and Hierarchies in Organizations*". Presented in the **Asian Meeting of the Econometric Society (AMES)**, Dec 20-22, 2012, New Delhi, India, paper 119, pp 1-19.

[C6] **Swaprava Nath**, Pankaj Dayama, Dinesh Garg, Y. Narahari, and James Zou, "*Mechanism Design for Time Critical and Cost Critical Task Execution via Crowdsourcing*". In Proceedings, **Web and Internet Economics (WINE)**, December 9-12, 2012, Liverpool, UK, pp 212-226. **Acceptance rate: 24%**

[C5] **Swaprava Nath**, Pankaj Dayama, Dinesh Garg, Y. Narahari, and James Zou, "*Threats and Trade-offs in Resource Critical Crowdsourcing Tasks over Networks*". In Proceedings, **AAAI Conference on Artificial Intelligence (AAAI)**, July 22-26, 2012, Toronto, Canada, pp 2447-2448. **Acceptance rate: 26%**

[C4] **Swaprava Nath**, Onno Zoeter, Y. Narahari, and Chris Dance, "*Dynamic Mechanism Design for Markets with Strategic Resources*". In Proceedings, **Conference on Uncertainty in Artificial Intelligence (UAI)**, July 14-17, 2011, Barcelona, SPAIN, pp 539-546. **Acceptance rate: 34%**

[C3] **Swaprava Nath**, "*Dynamic Learning-based Mechanism Design for Dependent Valued Exchange Economies*". PhD proposal, in Proceedings, **World Wide Web (WWW), PhD Symposium Track**, ACM, March 28 - April 1, 2011, Hyderabad, INDIA, pp 397-402. **Acceptance rate: 15%**

[C2] **Swaprava Nath** and Anurag Kumar, "*Performance Evaluation of Distance-Hop Proportionality on Geometric Graph Models of Dense Sensor Networks*". In Proceedings, **International Conference on Performance EVALUation MEthodologies and TOOLS (VALUETOOLS)**, ACM, October 21-23, 2008, Athens, GREECE, pp 4247:1-10. **Acceptance rate: 35%**

[C1] **Swaprava Nath** and Subrata Mitra, "*Linear Antenna Array with Suppressed Sidelobe and Sideband Levels using Time Modulation*". In International Conference On Computers And Devices For Communication (**CODEC**), December 2006, Kolkata, INDIA, pp 73-76.

Dissertations:

[D2] "*Mechanism Design for Strategic Crowdsourcing*", PhD Thesis, Indian Institute of Science, Bangalore, December 2013.
Advisor: Prof. Y. Narahari

[D1] "*Self Organisation in Random Geometric Graph models of Wireless Sensor Networks*", Masters Thesis, Indian Institute of Science, Bangalore, June 2008.
Advisor: Prof. Anurag Kumar

Other Paper(s):

[O1] **Swaprava Nath** and Balakrishnan Narayanaswamy, "*Improving Productive Output in Influencer-Influencee Networks*". Technical Report, 2013.

Tools Developed

- `Satyanweshi`: The Truth-seeking Chatbot (for COVID-19). This is a truth-checking chatbot, which carefully collects information from various reliable sources and informs whether a piece of news is true or not. It also gives general information on COVID-19, and provides googled results if it matches neither of the earlier classes. Website: `http://www.satyanweshi.net`. Video explainer: `https://youtu.be/DU6UnFBhpPk`. Joint work with Ankur Gupta, Yash Varun, Nithya Muttineni, Prarthana Das, Hamim Zafar, and Tanmoy Chakraborty.
- `SwaGrader`: evaluation of the students, by the students, for the MOOCs. This is an honest effort extracting peer-grading tool. A beta version of the tool is available here: `https://swagrader.cse.iitk.ac.in`. Video explainer: `https://youtu.be/_BGE3-FrkRU`. Joint work with Somu Prajapati, Ayushi Gupta, and Shubham K. Nigam.

Teaching

- **CS425: Computer Networks**, January - April, 2020, at IIT Kanpur
- **ESC101: Fundamentals of Computing**, January - April, 2019, at IIT Kanpur
- **CS712: Selected Areas of Mechanism Design**, January - April, 2018, at IIT Kanpur
- **CS711: Introduction to Game Theory and Mechanism Design**, July - November, 2017, 2018, 2020 at IIT Kanpur.
- **Comp271: Scientific Computing using Python**, July - November, 2014, at Indian Statistical Institute, Delhi.
- **Mathematical Programming with Applications to Economics**, January - April, 2014, at Indian Statistical Institute, Delhi. (co-taught with Debasis Mishra)

Student Advising

Graduate:

- **Rangeet Bhattacharyya**, PhD (CSE, IIT Kanpur), 2020 -
- **Anurag Maithani**, MTech (CSE, IIT Kanpur), 2020 -
- **Nivedita Shukla**, BS-MS (ECO, IIT Kanpur), co-advising with Prof. Wasim Ahmad, 2020 -
- **Aasheesh Dixit**, PhD (IIM Lucknow), co-advising with Prof. Suresh Jakhar at IIM Lucknow, 2019 -
- **Garima Shakya**, PhD (CSE, IIT Kanpur), 2018 -
- **Rahul Bhatta**, (thesis supervised, title: "Strategyproof Voting with Cardinal Preferences") Master of Science in Quantitative Economics (MSQE), Indian Statistical Institute, New Delhi, 2015.

Undergraduate:

- **Tanmay Anand**, CSE, IIT Kanpur, UGP, January-April 2020.
- **Vipul Shankhpal**, CSE, IIT Kanpur, UGP, January-April 2020.
- **Sudhanshu Bansal**, CSE, IIT Kanpur, UGP, January-April 2020.
- **Ayushi Gupta**, CHE, IIT Kanpur, UGP, August-November 2019.
- **Somu Prajapati**, CSE, IIT Kanpur, UGP, August-November 2019.
- **Jay Gupta**, ECO, IIT Kanpur, UGP, August-November 2019.
- **Sriram Varun Vobilisetty**, CSE, IIT Kanpur, UGP, August-November 2019.
- **Jatin Jindal**, CSE, IIT Kanpur, UGP, August-November 2018.
- **Shivam Pal**, EE, IIT Kanpur, UGP, August-November 2018.

- **Pawan Agarwal**, MTH, IIT Kanpur, UGP, August-November 2018.
- **Shivangi Ranjan**, EE, IIT Kanpur, UGP, August-November 2018.
- **Piyush Bagad**, "Characterization of Implementable Mechanisms for Various Domains in Quasilinear Setting", UGP, January-April 2018, at IIT Kanpur.
- **Sachin K. Salim**, "A Quantitative Comparison of Solo and Shared Ride", UGP, January-April 2018, at IIT Kanpur.

Interns:

- **Aaditya Ganesh**, Math and CS, Chennai Mathematical Institute, summer intern, April-August 2020.
- **Prarthana Das**, EE, IIT Kanpur, summer intern, April-August 2020.
- **Nithya Muttineni**, CSE, IIT Kanpur, summer intern, April-August 2020.
- **Yash Varun**, ME, IIT Kanpur, summer intern, April-August 2020.
- **Ankur Gupta**, EE, IIT Kanpur, summer intern, April-August 2020.
- **Jay Gupta**, SURGE summer intern, 2019 (IITK).
- **Jatin Jindal**, SURGE summer intern, 2018 (IITK).
- **Pranjali Agarwal**, summer intern, 2018 (LNMIT, Jaipur).
- **Mohak Kulashretha**, summer intern, 2018 (Shiv Nadar University).
- **Rohini Das**, summer intern, 2018 (Jadavpur University).
- **Shikhar Rastogi**, summer intern, 2018 (BITS Pilani, Goa).
- **Gargi Singh**, summer intern, 2018 (IITK).
- **Aditya Aradhye**, Summer Intern from Chennai Mathematical Institute, supervised at Indian Statistical Institute, New Delhi, 2015.

Academic Services

- Organizer, Computational Social Choice Theory Workshop (part of the conference *Foundations of Software Technology and Theoretical Computer Science* (FSTTCS), 2017), **IIT Kanpur**.
- Program committee and reviewing service: *Association for Advancement of Artificial Intelligence (AAAI)*, 2020, 2021, *International Joint Conference on Artificial Intelligence (IJCAI)*, 2016, 2017, 2018, 2021, *Web and Internet Economics (WINE)*, 2012, 2015, 2017, *ACM Conference of Economics and Computation (EC)*, 2018, 2020, *Computational Social Choice (COMSOC)*, 2016, *Mathematical Social Science*, 2015.

References

Y. Narahari
Professor, Department of Computer Science and Automation, Indian Institute of Science, Bangalore.
Email: narahari@iisc.ac.in, Web: `http://lcm.csa.iisc.ernet.in/hari/`

Ariel Procaccia
Gordon McKay Professor of Computer Science, Harvard University.
Email: arielpro@seas.harvard.edu, Web: `http://procaccia.info`

Arunava Sen
Professor, Economics and Planning Unit, Indian Statistical Institute, New Delhi.
Email: asen@isid.ac.in, Web: `http://www.isid.ac.in/~asen/`

Candidate Profile at a Glance – Swaprava Nath

Current Affiliation	Assistant Professor, Department of Computer Science and Engineering Indian Institute of Technology Kanpur, 2017 – till date
Previous Affiliations	Fulbright-Nehru Postdoctoral Fellow, Carnegie Mellon University, 2015 – 2017 Lecturer and Post-Doc, Indian Statistical Institute, New Delhi, 2013 – 2015 PhD Candidate, Computer Science and Automation, Indian Institute of Science, Bangalore, 2009 – 2013
PhD Thesis Title	Mechanism Design for Strategic Crowdsourcing
Research Interests	Game theory, mechanism design, artificial intelligence, multi agent systems, computational social choice, crowdsourcing, social networks
Publication Profile	Journals: 8 (Management Science, Games and Econ Behav, JAIR, ACM TEAC, ACM TOSN, Rev of Econ Des, Econ Letters) Peer-reviewed Conferences: 20 (IJCAI, AAAI, AAMAS, HRI, WINE, WWW) Working papers: 5 **Total citations: 344, h-index: 7** (source: Google Scholar)
Research Abstract	My research lies in the intersection of microeconomics and computer science. In particular, I work on the theory and applications of mechanism design that actively involve computational science as a tool of analysis and the Internet as a method of implementation. My research has two complementary themes: one provides solutions to combat the strategic behavior of the multiple rational and intelligent agents or systems in these applications, and the other theme uses artificial intelligence to assist humans take provably efficient decisions. We model the strategic behavior using a game theoretic framework and provide mechanism design solutions that are provably efficient and stable. On the other hand, we use a computational framework to analyze the performance of the system quantitatively. The connection between these two analysis techniques gives rise to many interesting questions and elegant solutions in the versatile domain of multi-agent systems.
Research Collaborators	*Y. Narahari* (PhD thesis advisor, IISc Bangalore), *Onno Zoeter* (Former researcher at Xerox Research), *Arunava Sen* (Professor, Indian Statistical Institute, New Delhi), *Ariel Procaccia* (Professor, Harvard University), *Tuomas Sandholm* (Professor, Carnegie Mellon University)
Awards and Achievements	Senate commendation for teaching excellence in the course "CS711: Introduction to Game Theory and Mechanism Design" taught in the 2020-21-I semester, IIT Kanpur. Our solution *Satyanweshi*, a truth-seeking chatbot, secured the second place in MHRD AICTE Samadhan online challenge in response to COVID-19, 2020. *Fulbright-Nehru Postdoctoral Fellowship*, 2015 – 17 *Honorable Mention in Yahoo! Key Scientific Challenges Program*, 2012 *Intern Day Prize*, 2010, at Xerox Research Centre Europe, France *Tata Consultancy Services PhD Fellowship*, 2010 GATE 2006: *All India Rank 34* (stream: EC) Rank in Undergraduate University: *2 (Bronze medal)* WBJEE 2002: *State Level Rank 25 (Engineering)* 10+2 School Leaving Exam: *State Level Rank 28*
Teaching Experience	5 full and 1 co-taught courses at IIT Kanpur and Indian Statistical Institute, New Delhi. Teaching assistant for 7 courses at Indian Institute of Science, Bangalore, 2010 - 13
Graduate Student Advising	2 full and 1 co-advised PhD (ongoing) and 3 Masters (2 ongoing) students.
Internships	Harvard School of Engineering and Applied Sciences, Fall 2011 Xerox Research Centre Europe, France, Summer 2010
Other Services	Organizer, Computational Social Choice Theory Workshop (part of the conference Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2017), IIT Kanpur. Program committee and reviewing service: AAAI 2020, 2021, IJCAI 2016, 2017, 2018, 2021, Web and Internet Economics (WINE), 2012, 2015, 2017, ACM EC 2018, 2020, Computational Social Choice (COMSOC), 2016, Mathematical Social Science, 2015.
Industry Experience	Software engineer in Cisco Systems (India) Private Limited, 2008 - 09

Last updated: Mar 20, 2021

भारतीय प्रौद्योगिकी संस्थान कानपुर
Indian Institute of Technology Kanpur

निदेशालय
Directorate

अभय करंदीकर
निदेशक
Abhay Karandikar
Director

February 17, 2021

Dr. Swaprava Nath
Department of Computer Science & Engineering
Indian Institute of Technology Kanpur

Subject: Students Reaction Survey

Dear Prof. Nath,

Your performance as an instructor of the course **CS711A: Introduction to Game Theory and Mechanism Design** during the Semester **2020-21-I** has been rated exceptionally good by the students. I am very pleased to note that you have discharged your duties in an exemplary manner. On behalf of the Academic Senate and on my own behalf, I congratulate you, and hope that you will keep inspiring the coming generations of students.

Best regards,

(Abhay Karandikar)
Chairperson, Academic Senate

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