Comments from Arts & Sciences

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COLLEGE OF ARTS & SCIENCES

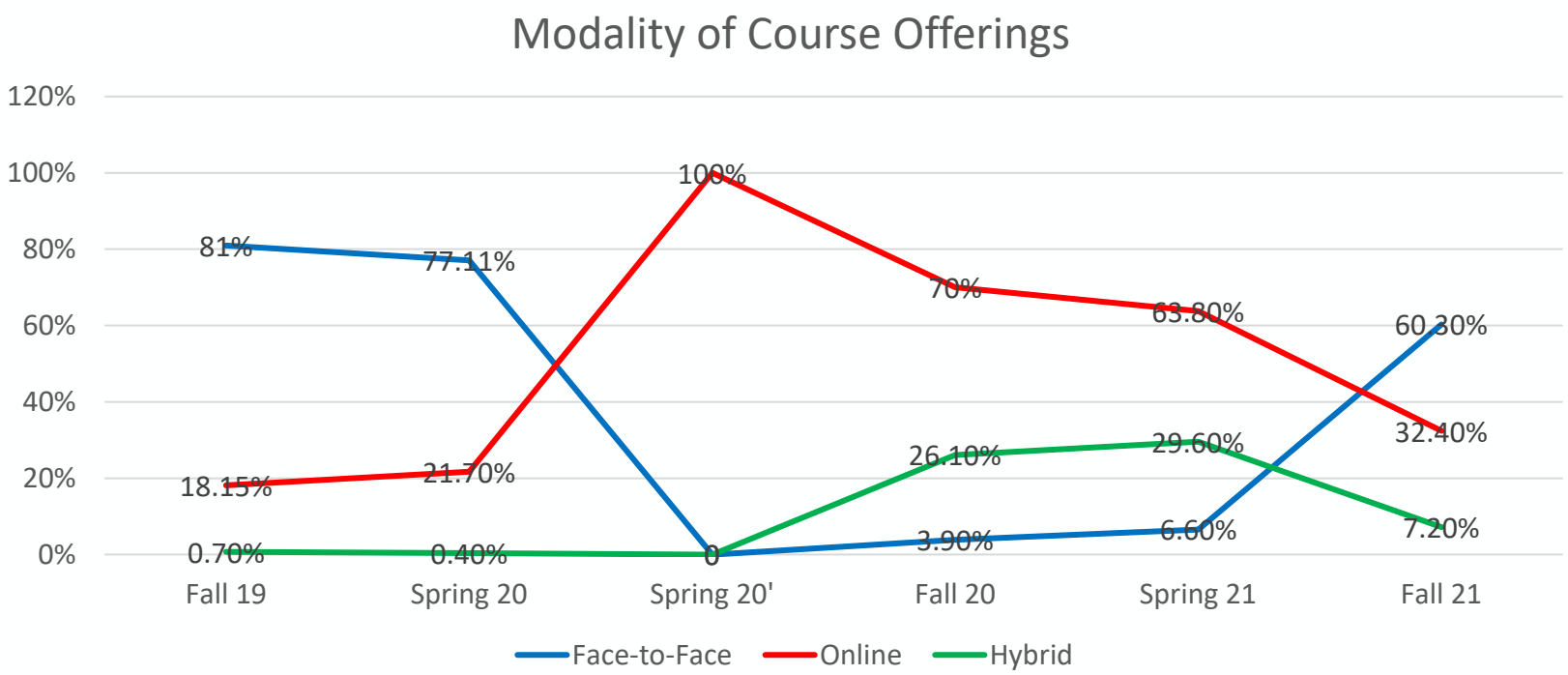
BE BOLD. Shape the Future.
New Mexico State University

Creation of a New College

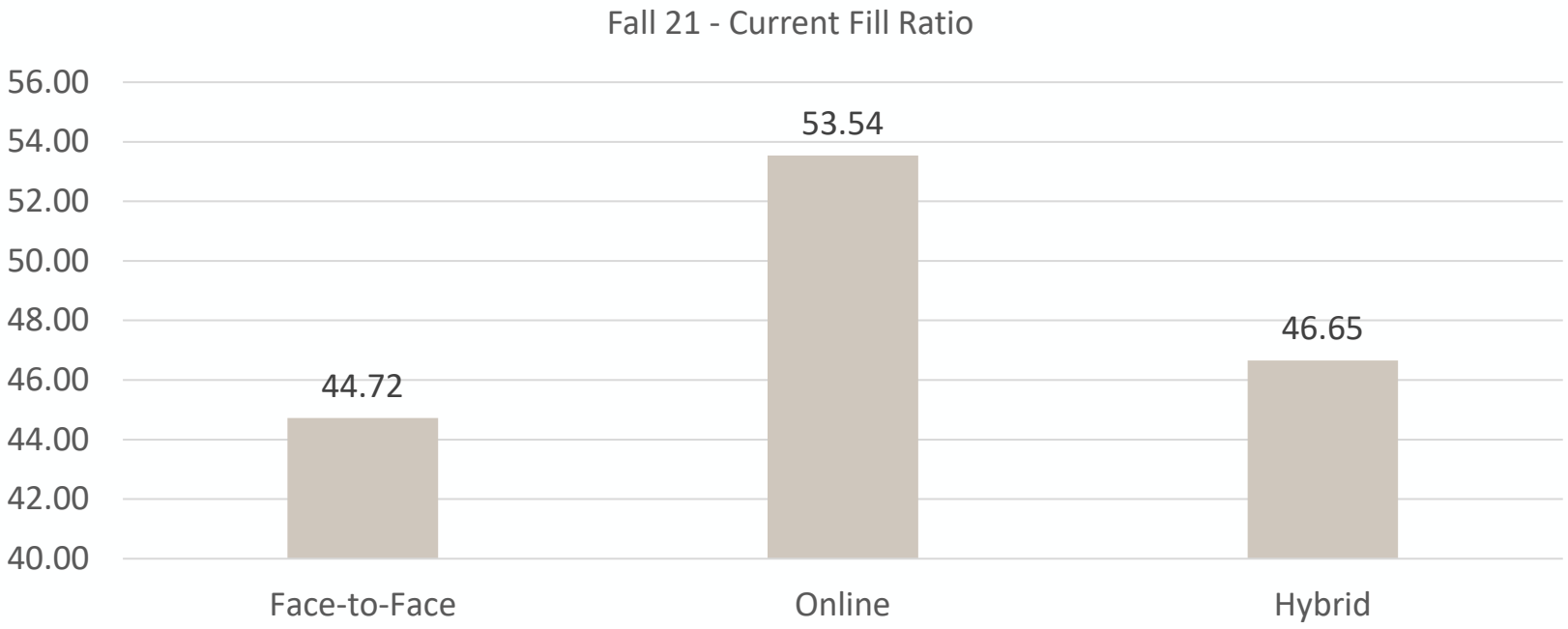
- College of Health, Education and Social Transformation
  - Administrative combination of
    - College of Education
    - College of Health and Social Services
    - Department of Sociology
  - Goal
    - Create the first NMSU cradle of truly transdisciplinary research and education
    - Create the home of knowledge creation to address the challenges of health and education in diverse communities
    - Embed sociology theory and social transformation across the domains of health and education
  - Initial Motivation
    - Dozens of health-related programs disseminated across multiple colleges
  - Benefits
    - Facilitate development of innovative curricula at the intersection of social justice, health and education
    - Facilitate the cross-training of students from complementary disciplines
    - Facilitate the formation of interdisciplinary research team & enhance research competitiveness
    - Prepare students to address health and educational challenges from rural and disadvantaged communities
    - Enable new educational and research collaborations (e.g., BCOM)

Adapting to a New Way of Teaching

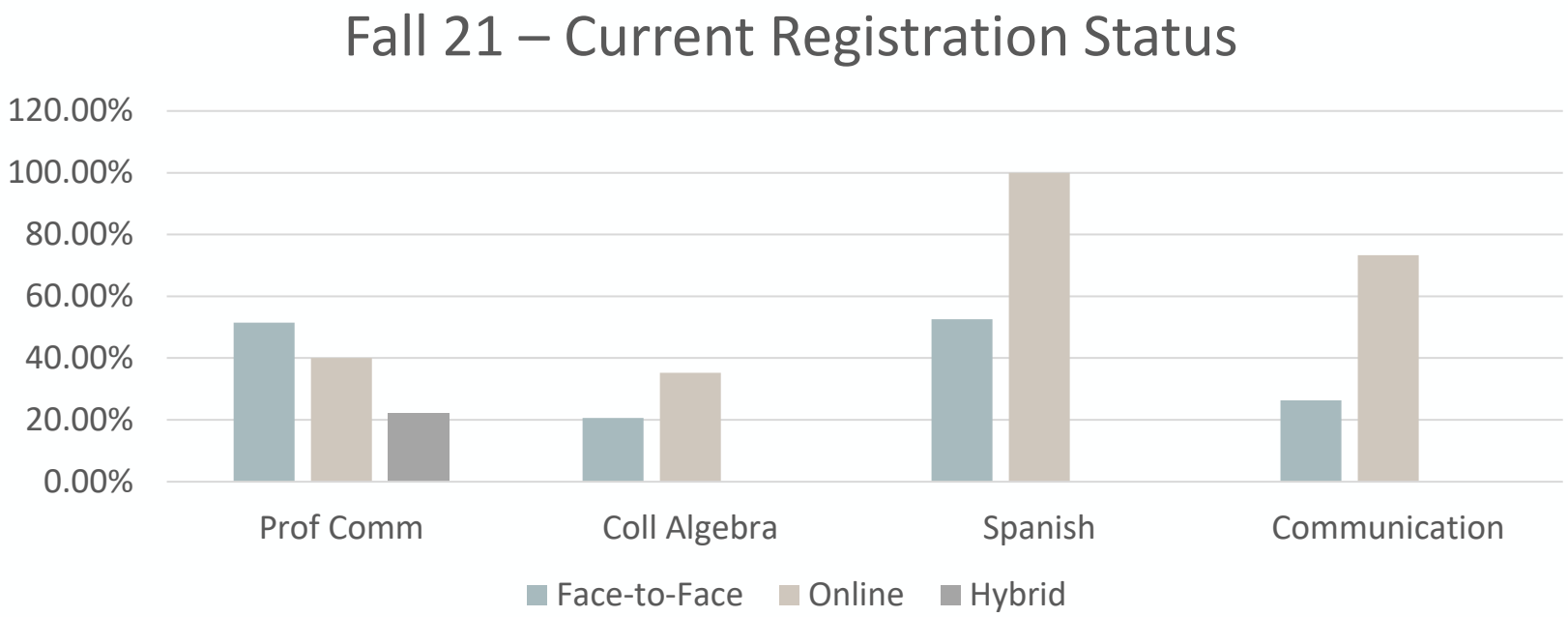
Modalities of Course Offerings



How quickly different types of courses are filling?



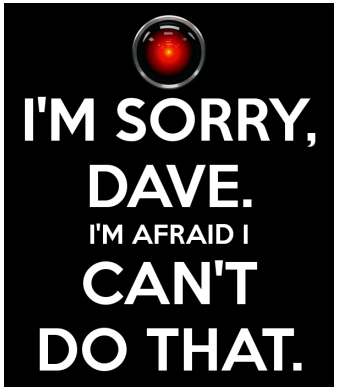
Status of Registration for Core GenEds



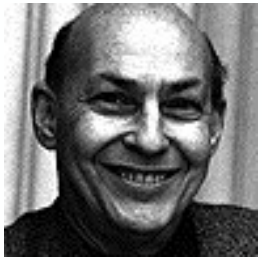
Jobs of the Future

ARTIFICIAL INTELLIGENCE

What is Artificial Intelligence?



- The term “Artificial Intelligence” was coined in 1955 by John McCarthy
  - Study and development of computing systems that model and apply the intelligence of the human mind to solve problems [Minsky]
  - A branch of computer science dealing with the simulation/emulation of intelligent behavior in problem solving [McCarthy]
  - The capability of a machine to imitate intelligent human behavior
- The machine executes a program that demonstrates intelligent behavior

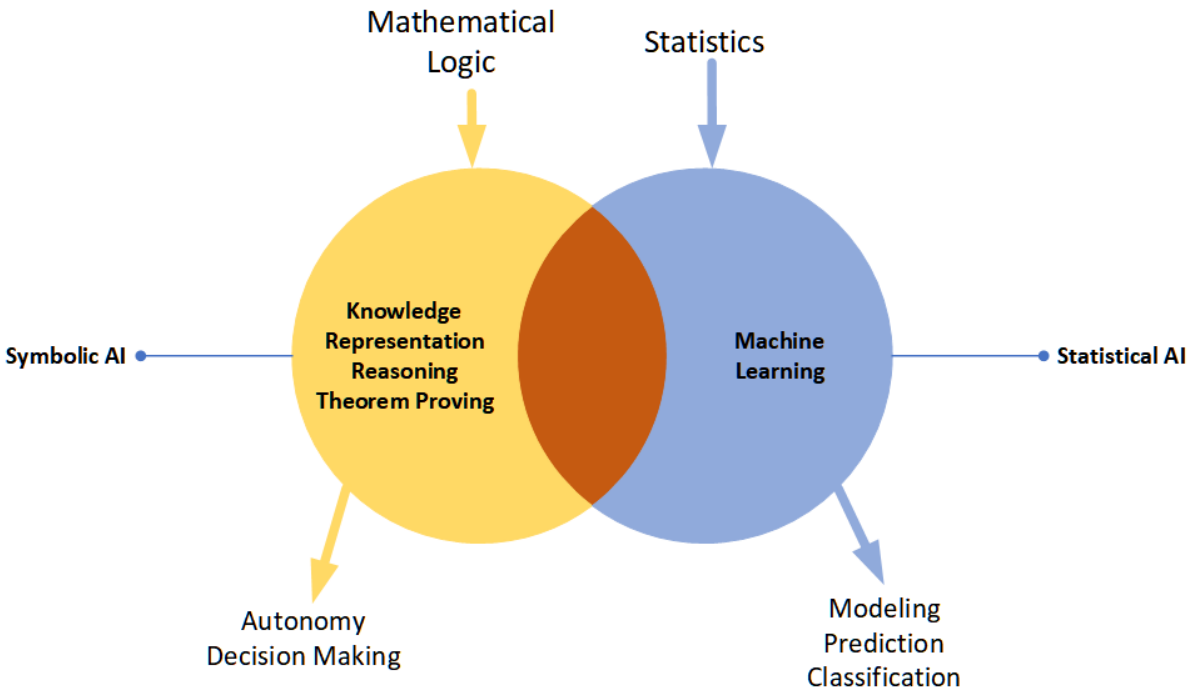


AI Landscape

- Artificial Intelligence has been around since late 1950
- AI went through several "**Summers**" and "**Winters**"
  - 60s – connectionism, translation, automate theorem proving
  - Eary 70s – first winter (ARPA, Lighthill report)
  - 80s – expert systems, Fifth Generation, planning
  - 90s – second winter (FGCS, DARPA)
  - Ongoing challenges – social ills, unemployment, end of humanity
- Today: Hot Summer
  - From Clever to Stupid
  - Data, data, data
  - Computing Power
  - Integration

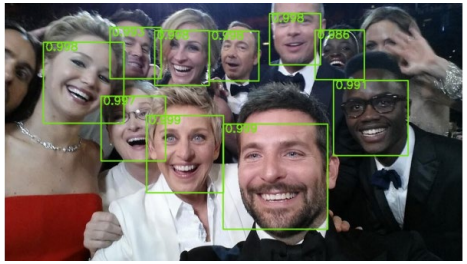
AI Today

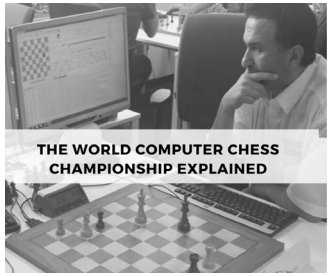
- For the first time AI to the general users
  - SIRI/Cortana
  - Video Games
  - Voice Recognition
  - Robotics/drones
- When today you hear AI:
  - **Machine Learning**
- Huge accumulation of **data**
- How to get from Data to **Knowledge**
  - Dependences/ Predictions
  - Classification
  - Rules

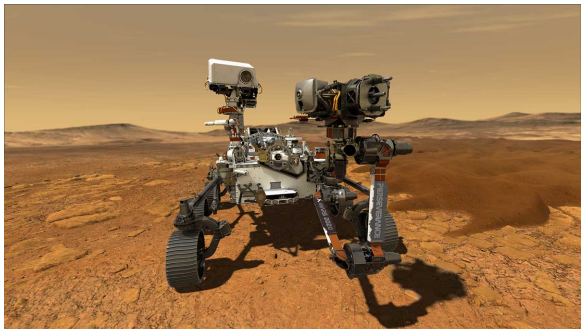


AI in the Real World

- Impressive success stories in selected domains

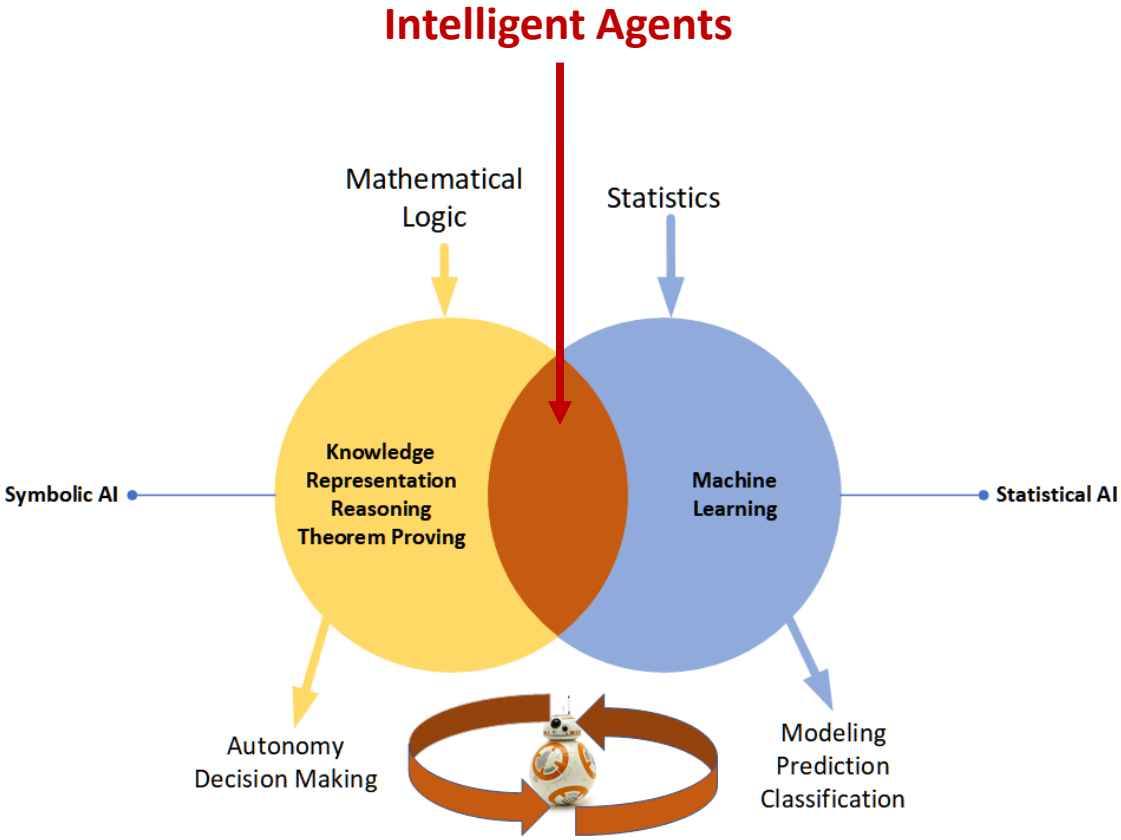






AI Tomorrow


Data Repositories
Data Collection, Curation, Reduction,....


Intelligent Agents
Mathematical Logic
Statistics
Symbolic AI
Knowledge Representation Reasoning Theorem Proving
Machine Learning
Statistical AI
Autonomy Decision Making
Modeling Prediction Classification

AI Tomorrow (or already today…)

- Intelligent agents
  - An agent can be anything that **perceives** its environment, **thinks** about the environment and itself, and **acts** upon that environment through actuators
- Components of an Agent
  - **Knowledge** (about the world, about other agents, about itself)
  - **Reasoning** capabilities
    - Planning, Diagnosis, …
- Current Challenges
  - Explainability
  - Elaboration Tolerance
  - Performance and Scalability
  - Multi-agent systems (collaborative, competitive)
  - Epistemic reasoning (knowledge, beliefs, intentions, desires)

AI and Jobs

- Computing is still a field with unprecedented career opportunities
  - In the US there are over 400,000 open computing jobs
  - About 71,000 graduates joined the workforce last year
  - In New Mexico – about 1,800 open positions, with 173 CS graduates last year
- Job forecasts in AI are even more promising
  - US AI market is $11.4 billion in 2019
    - Predicted to reach $266 billion in 2027
  - World Economic Forum forecasted
    - 85 million jobs to be replaced by AI automated systems by 2025
    - 93 million new jobs created in AI by 2025
    - 75% increase in demand over the last four years
  - Data Analytics
    - In the US along close to 3 million positions

AI and New Mexico State University

- Computing Research Laboratory (1983)
  - Created with State funding as part of the Rio Grande Corridor
  - 12 full-time researchers and dozens of affiliated researchers
  - Ground-breaking research in areas like Natural Language Understanding, Automated translation, robotics, and vision.
- Computer Science Department
  - Long standing tradition of research in Symbolic AI and Autonomous Systems
  - 2011-2020: Top-50 US Institutions in AI [csrankings]
- Formal degrees
  - Formal concentration in AI in the CS undergraduate program
  - Master in Data Analytics
- Built talent pool
  - AI researchers in CS, A Stat, EE, ME, IE, Sociology, Mathematical Sciences
  - Effort to establish a broad AI & Data Science umbrella
- AI4All College Pathways
  - NMSU, UNT, Illinois Urbana-Champaign, Texas A&M

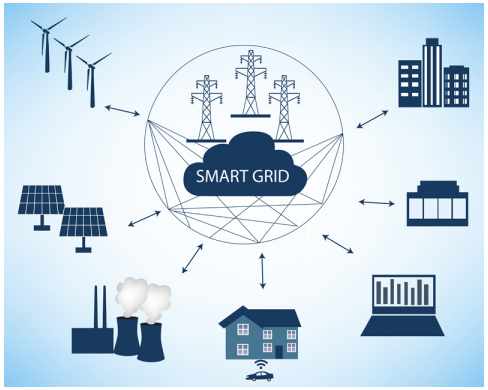
Jobs of the Future

CYBERSECURITY

Cybersecurity

- Key areas:
  - Hardware, Network, and Software Architectures
  - Governance, Risk, Compliance
  - Incident prevention – access management, penetration testing, secure operation
  - Incident Response and forensic analysis
  - Secure Software Development
- "Homes" of cybersecurity
  - Governance/Risk/Compliance – information systems programs
  - Secure operation and prevention, forensics – information technology
  - Secure software development, secure architectures – computer science

Cybersecurity at NMSU



- Launched a broad effort to build capacity in 2016
  - Faculty members in CS (3), EE (3), ICT (2), Information Systems (1)
- Bachelor of Science in Cybersecurity
  - Launched in 2020 – inaugural class of 11 students
- Extensive research efforts
  - Notable integration work in iCREDITS
  - Greater emphasis since 2015 on cybersecurity in cyber-physical systems
- Work in progress
  - Professional Master in Cybersecurity – coordinated with NMTech
  - Micro-credentials in cybersecurity
    - NMSU-OnDemand
    - Preliminary conversations with NM Rural Coops and NRECA

THANK YOU