AGENDA 1 TECHNOLOGY, ENGINEERING, AND INDUSTRY 4.0 RESEARCH	
Description	Technology, Engineering, and Industry 4.0 Research involves research, development, innovation, and extension programs or projects that would embrace technological and engineering advances to improve productivity and maintain an edge in innovation. The program includes projects or research intended to explore approaches towards new trends for creating various solutions through computational systems and services, artificial intelligence, digital, media and creative content, ubiquitous or pervasive computing, human-machine interaction, integrated farming systems, ICT for development, web science, smart and green technology, Internet-of-People, Internet-of-Services, Internet-of-Things (IoT) or Internet-of-Everything (IoE), product-equipment-process-systems innovation, automation and instrumentation and control, renewable energy, green building, simulation, materials engineering, and traffic engineering that can make institutions, organizations and the whole community autonomously exchange information, trigger actions and control each other independently.
Main Goal	The program aims to design and develop innovative solutions by integrating various approaches to information technology, Engineering, and another related fields.
Specific objectives	1. Design and develop systems or devices using sensors and actuators to immerse and interact with the environment. 2. Enable innovation, invention, creation, and deployment of new models to solve complex computing problems or meet real-time requirements of systems. 3. Designed and developed algorithms and techniques for massive, multimodal, and heterogeneous data collections for analysis towards a faster and more reliable integration of extensive data from structured, unstructured, and real-time sources. 4. Find new ways to improve systems and services' energy and power efficiency. 5. Develop innovative management systems for agriculture for the production of high-value products. 6. Streamline technological research with the national and international scientific agenda. 7. Build collaborative work through interdisciplinary and transdisciplinary approaches. 8. To promote organizational efficiency, design and develop processes, systems, products, and equipment innovation. 9. Design and develop material and traffic engineering. 10. Designed and developed automation, instrumentation, and control.
Target Beneficiaries	***Areas of Research***
Global Needs	1. Data Science (Analytics Machine Learning) 2. Development of AI-based Platforms 3. AI (applications) 4. Renewable energy 5. Online Teaching Tools
National Needs	1. Animation and Game Development 2. Green Technology 3. Software Development 4. Internet of Things / Internet of Everything 5. Automation, instrumentation, and control
Regional Needs	1. Farming Improvement 2. Farming Technology 3. Material and Traffic Engineering
Sectoral Needs	1. Agricultural and Fishery Products 2. Agricultural Products – Enhancement of Machines
Community Needs	1. ICT for smart communities
Institutional Needs	1. Library Technological Needs 2. Laboratory Systems Improvement 3. Simulation Laboratory Equipment

Research Program Title	**Smart Higher Education Institution Through Technology Innovation**
Program Description	Technological development is an influential driving force for creating new opportunities and ways to manage existing challenges. Technological developments reflect how relevant processes should be performed in the fast-changing digital era. The changes lead to the adoption of a variety of smart solutions in educational environments to improve the performances of both teachers and students. The present pedagogy is the digital classroom with meaningful and innovative use of technology, renovating the methods and approaches of teaching and learning in higher institutions. The program focuses on teaching, learning, and services higher education institutions offer. Smart HEI is rapidly changing the approach and methodology teachers use to teach, and students learn innovatively using technology. Smart HEI creates new opportunities in teaching and learning by integrating computer, multimedia, and network technology and has changed the concept of learning (classroom teaching). Development of software or system as part of the program are the parameters and expected operation of a real-world system, process, or physical product in a virtual, augmented, or digital environment to assess technology for performance optimization, engineering, testing, training, education, computing, and information technology.
Research Agenda	**Technology, Engineering, and Industry 4.0 Research**
Research Area	Animation and Game Development, Entertainment and Multimedia, Software Development, Education, Technology Development
Target Beneficiaries	Institutional Needs, Regional Needs, National Needs, and Global Needs
Target Outcomes	1. Copyrighted materials and software 2. Patented prototypes 3. Utilized programs/software. 4. Commercialized technologies 5. Paper Presentation and Publication 6. Policy for Adoption of Technology
Target Outputs	1. Interactive Modules/ Teaching Materials 2. Augmented and Virtual Reality- based games 3. Prototypes and Simulation 4. Web and Mobile Applications 5. Research paper. 6. Community Extension Projects
Research Projects	**Innovative Application Development** 1. Assessment and Design of an Augmented, Virtual, or Simulation-based learning environment 2. Development and Validation of an Augmented, Virtual, or Simulation-based learning environment 3. Evaluation of ICT and AI tools used in educational digital transformation. 4. Development of an Automated exam generator with a table of specifications. **Smart Services** 1. Assessment and Design of Efficient and Smart Ecosystem of Student Services 2. Design & Development of Web or Mobile Applications using Emerging Technologies for Higher Education Institution Student Services 3. Improving Information Accessibility: Design, Development, and Evaluation of a News Website for a Public Secondary School 4. Usability Study on the Design & Development of Web or Mobile Applications for Higher Education Institution Student Services 5. Development and Validation of Infrastructure for Smart Service and Application
Relevant Literature	An Online Collaborative Ecosystem for Educational Computer Graphics (https://dl.acm.org/citation.cfm?id=3338133) Pedagogy that Supports Computer Science for All (https://dl.acm.org/citation.cfm?id=3322210) A Review of Gamification Platforms for Higher Education (https://dl.acm.org/citation.cfm?id=3136299) The Use of Games as Extrinsic Motivation in Education (https://dl.acm.org/citation.cfm?id=2702282)
Supervisors	1. David Eric S. Oreta
	2. Rover Sinag
	3. Donabell S. Hernandez

Time Frame (short to medium term)	Medium-term -5 years

Research Program Title	**Future and Beyond of Computing and Engineering for Society, Technology and Connectedness**
Program Description	Computing and Engineering research target issues running across industries and communities to respond to real-time trends; using digital transformation to unlock new growth pathways requires creative thinking. Progress and transformation are taking place at breakneck speed, and global flows of information, technology, products, services, and capital continue to expand with immeasurable timing, pace, and impact. The world is interconnected economically, environmentally, politically, socially, and technologically with acceleration and complexity concerning the environment and society. The program aims to establish and integrate computational modeling and research in several areas of knowledge within promising innovation fields, which involve connectivity, data transport, devices (sensors), analytics, software platforms and management, consulting and support, security, and emerging trends in computing. It focuses on interdisciplinary technological collaborations as a key to innovation. The processes were characterized by open innovation (incorporating external ideas) for value enhancement, innovation, and ideation.
Research Agenda	Technology, Engineering, and Industry 4.0 Research
Research Area	Automation, Data Science, Software/System Development, Internet of Things/Internet of Everything, AI,
Target Beneficiaries	Institutional Needs, Regional Needs, National Needs, and Global Needs
Target Outcomes	1. Copyrighted materials and software 2. Patented prototypes 3. Utilized programs/software 4. Commercialized technologies 5. Paper Publication 6. Implementation of projects
Target Outputs	1. Developed Prototypes 2. Web and Mobile Applications 3. Tested and Evaluated Prototypes 4. Deployment of prototype 5. Research paper 6. Community Extension Projects
Research Projects	**Beyond Data Science** 1. Assessment of ethics and transparency in data collection, use, and dissemination. ~~2.~~ Application and Performance Evaluation of Data Science Algorithm 3. Development using Data and Information Science 4. Development of sensor networks for decision-level predictions 5. Development of real-time data mining and monitoring ~~6.~~ Development of Innovative AI Solutions in the Agriculture Sector. **Artificial Intelligence and the Future** **7.** Assessment of Artificial Intelligence Devices for HEIs 8. Augmented Safety through Smart Environments 9. Applying AI algorithms to systems 10. Development of decision-making based on autonomous reasoning and learning system ~~11.~~ Development of Intelligent Systems for Disaster Prepared and Management. 12. Development of a system utilizing Natural Language Processing 13. Development of systems or applications using Computer Vision **Internet of Things and Connectivity** 14. Design and Simulation of Campus-Wide IoT Communication Infrastructure for MSEUF Lucena 15. Development of Innovative IoT Applications in the Consumer Market 16. Development of Innovative IoT Applications in Agriculture Sector 17. Development of IoT-Based Monitoring and Control System

	Sustainable Computing 18. Design and Development of Applications for Green Computing. 19. Designed and Developed Power-Aware Resource sharing and network management.
Relevant Literature	IoT for the Users: Thermal Comfort and Cost Saving (https://dl.acm.org/citation.cfm?id=3332479) Emerging Technologies: What will the world be like in 2030? (https://www.bbva.com/en/us/bbva-employees-pack-their-bags-for-overseas-opportunities/) 2030 Advanced Technology from an Asian Perspective (https://ieeecs-media.computer.org/media/tech-news/2030-advanced-tech-asia-perspective-itri.pdf) Future Technology Themes: 2030 to 2060 (https://apps.dtic.mil/dtic/tr/fulltext/u2/a591405.pdf) Latest Thesis Research Topics and Ideas in Green Cloud Computing http://www.e2matrix.com/blog/2021/03/30/latest-thesis-research-topics-and-ideas-in-green-cloud-computing
Supervisors	1. Roselyn A. Maaño
	2. Rodrigo C.Belleza Jr.
	3. David Eric S. Oreta
Time Frame (short to medium term)	Medium Term – 5 years