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- BK21 FOUR Project -

Innovation talent training project

New Industry – Big Data

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Industry Bigdata Convergence Education-Research Group

Chonnam National University  
Department of Mathematics and Statistics

- I. The organization, vision and objectives of the education-research group

## 1. The organization, vision and objectives of the education-research group

### 1. Vision and objectives of the Education-Research Group

#### 1) The Vision and Goals of the Education Research Group



## 1. The organization, vision and objectives of the education-research group

### 1. Vision and objectives of the Education-Research Group

2) Future goals of the Education Research Group in conjunction with the results of benchmarking analysis of the world-renowned universities

■ Future goals of the Education Research Group in conjunction with benchmarking analysis results

#### ■ Creating and operating a Data Science major

- Educate by organizing core subjects centered on data science
- Provide students with the convergence education opportunities they want by placing a number of elective subjects in addition to the required curriculum.
- Provide basic knowledge education that should be common for big data analysis by opening common basic subjects in addition to major subjects.

## 1. The organization, vision and objectives of the education-research group

### 1. Vision and objectives of the Education-Research Group

#### 3) Stabilization and Sustainability Improvement of Educational Research Group as Bachelor's Unit

##### ■ Selection of outstanding students

- Operation and promotion of various participation-inducing programs for undergraduates
- Attracting Outstanding Students by Securing the Scholarship System
- Attracting outstanding students through exchange with overseas universities

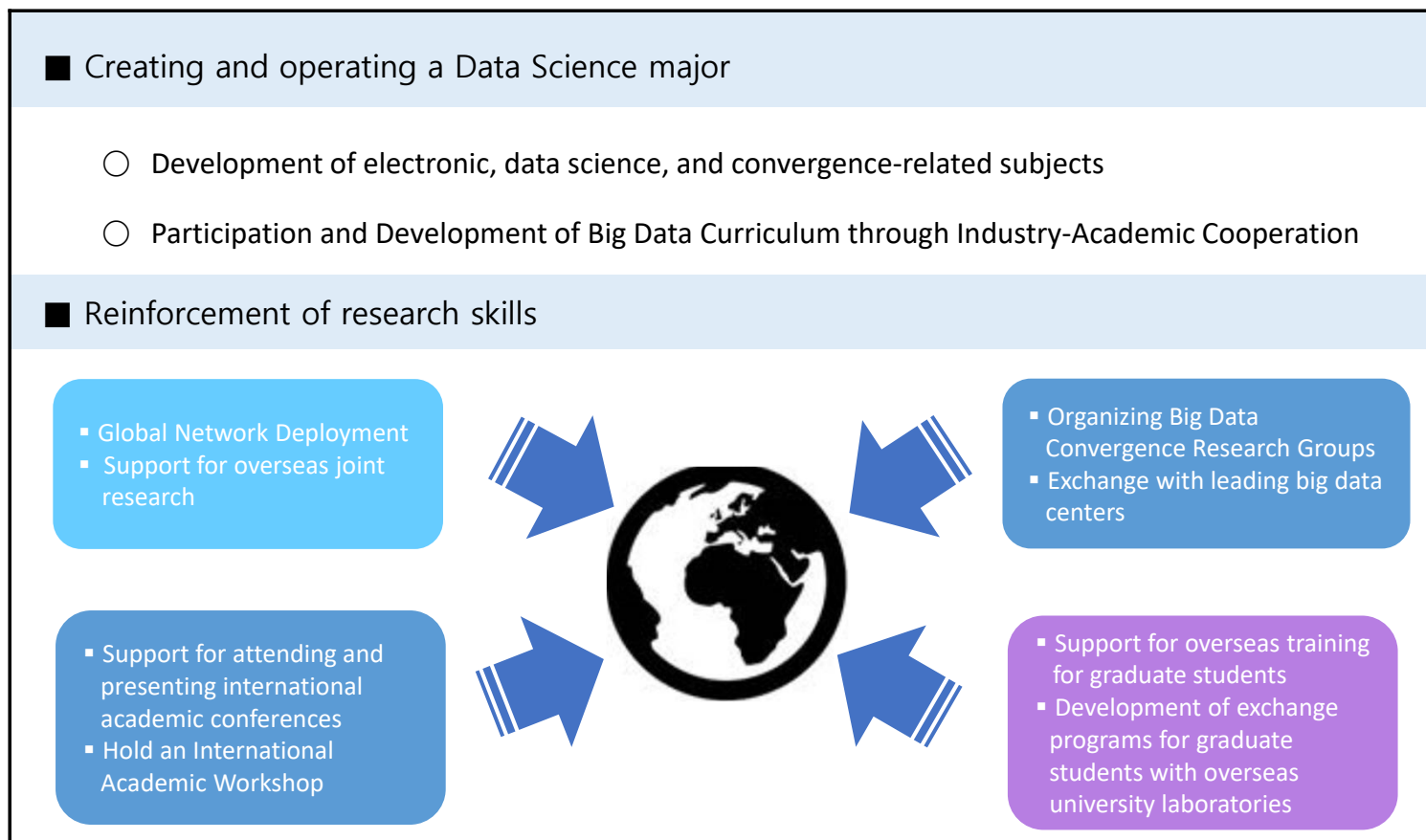
##### ■ Maintaining educational environment

- In addition to this project, various additional resources are secured through research support projects in schools, support from associations and cooperative agencies, and suburban research projects.
- Continuous development of curriculum reflecting new analysis methods based on the development of big data industry
- Flexible and practical educational curriculum that can be used by inviting experts from public institutions, researchers, industries, and academic and association
- Five GPU servers are secured to secure devices for deep learning analysis, and have labs and personal computers for graduate students.

## 1. The organization, vision and objectives of the education-research group

### 1. Vision and objectives of the Education-Research Group

#### 4) A plan to achieve the representative future goals of the Education Research Group



## 1. The organization, vision and objectives of the education-research group

## 2. Organization of Educational Research Groups

### 1) Appropriateness of the Organization of Education Research Group - Feasibility of Mathematics/Statistics Department for the Performance of Big Data Education and Research

#### ■ Establishing the optimal infrastructure for big data education and research

- Secure computer labs for big data training - have 88 hands-on PCs
- Five 2080TI×8 Linux-based GPU servers in operation.
- New Big Data Convergence Department in AI Convergence University in 2021 – 40 freshmen selected from 2021 (Approved by Ministry of Education)
- New Data Science Major in Graduate School of Mathematics/Statistics for the Second Semester of 2020

#### ■ Possibility of achieving future goals

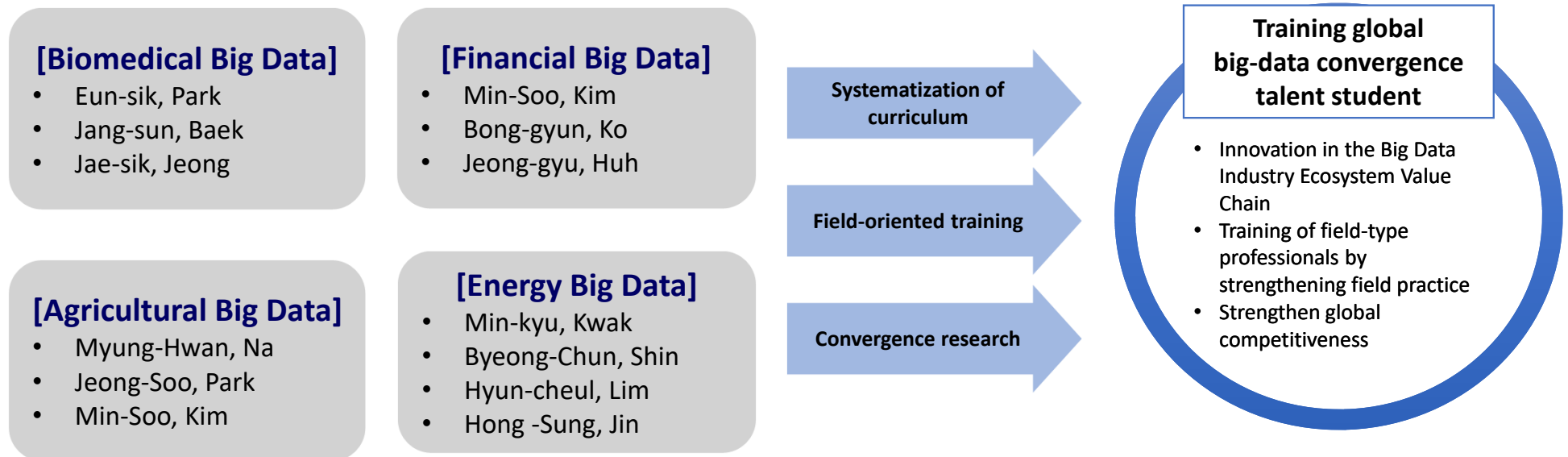
- The department of mathematics and statistics is a subjective department of the CK-I Big Data-based Science Talent Development Project, and obtained Grade A (1st place) in the Ministry of Education's comprehensive evaluation of university specialization projects.
- Successful achievements in industry-academic cooperation and internationalization, including two overseas financial institution training programs in LINC+ Big Data Financial Convergence Program Project
- The undergraduate statistics department successfully carried out two big data undergraduate support programs, especially in the CK-I project, administrative and financial support for undergraduate students, and quality improvement of undergraduate students and career employment.

## 1. The organization, vision and objectives of the education-research group

## 2. Organization of Educational Research Groups

2) Appropriateness of the training research group – Appropriateness of the participating faculty

Vision: fostering world-class education and research competitive big data research-oriented departments



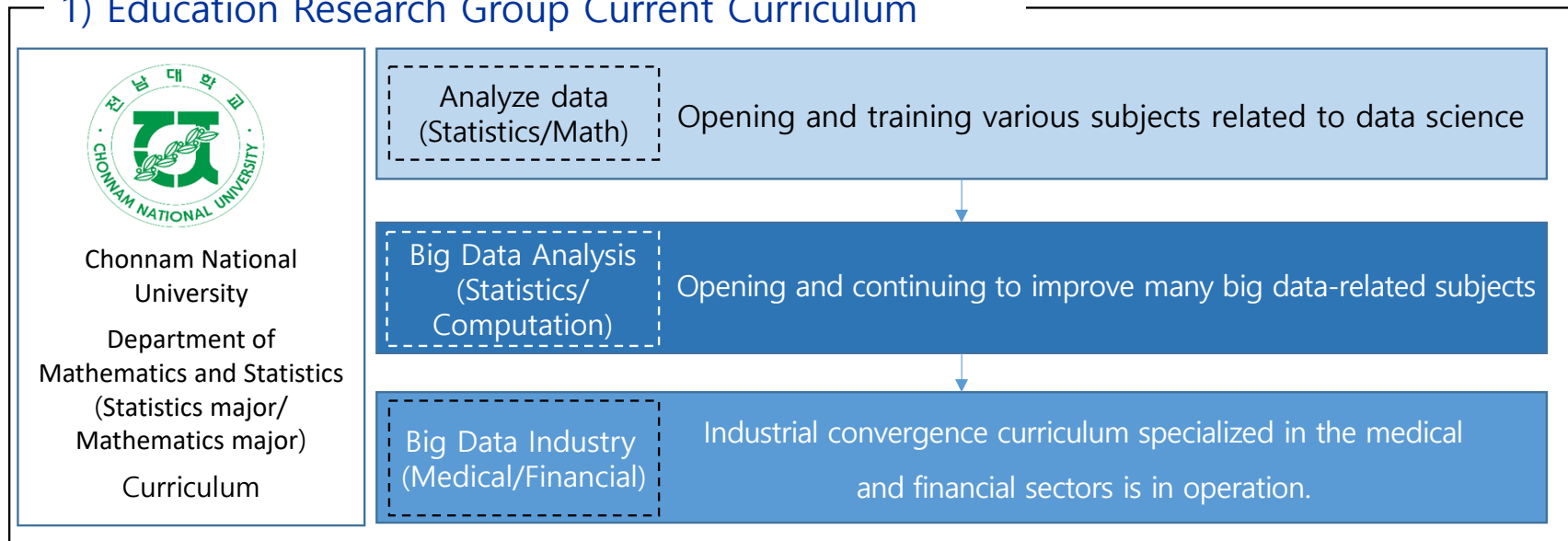


## II. Education Competency Area

## 1. Curriculum Organization and Operational Planning

### 1. Curriculum Organization and Operational Planning

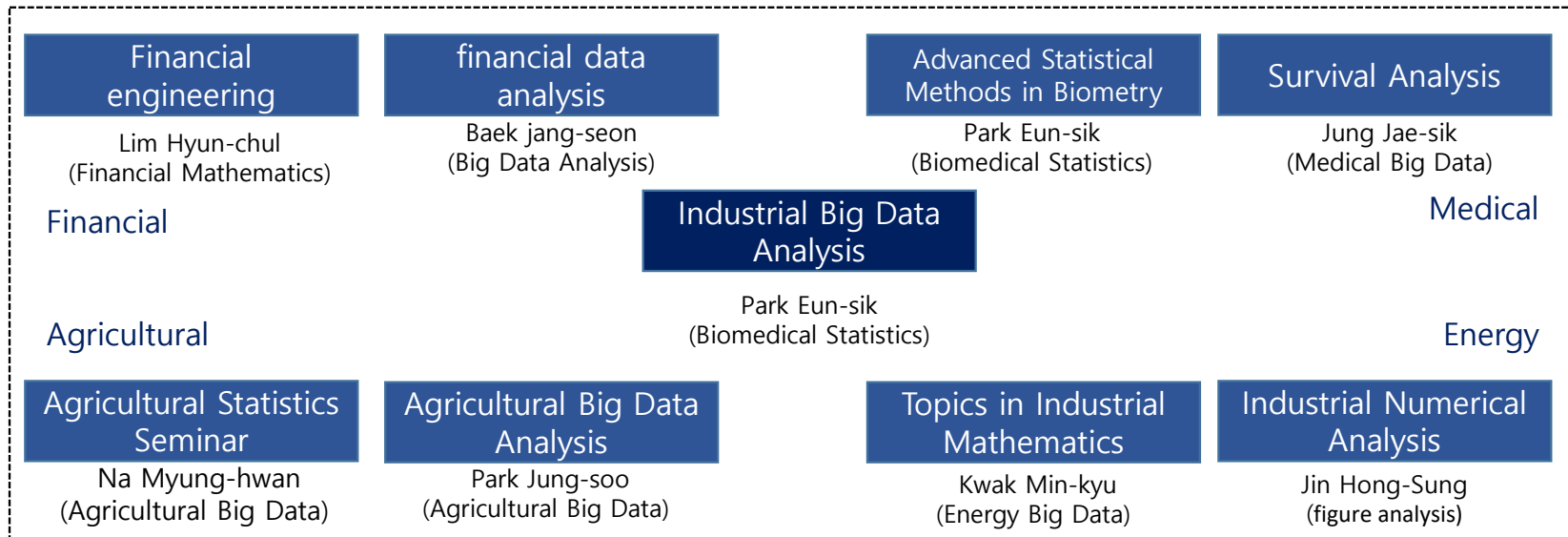
#### 1) Education Research Group Current Curriculum



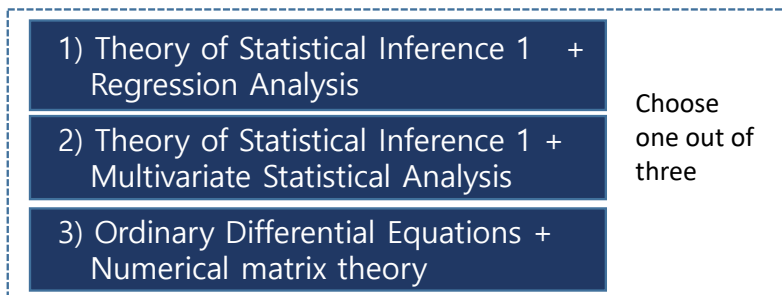
#### 2) Requirements for Graduation from the Education Research Group

Master	Presentation of papers at least once at a national conference or publishing one or more papers as the first author in the academic journal of the Korea Research Foundation.
Ph.D	Publishing one or more papers as the first author in the SCIE journal.

## Convergence Industry Subject

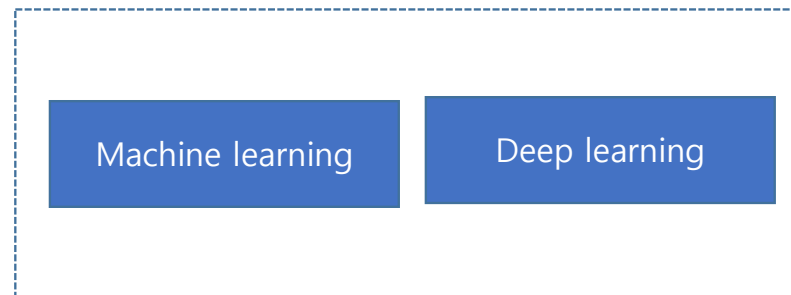


## compulsory subjects (until 2020 admission)



or

## (From 2021 Admissions)



- **Master's program** (24 credits): 1 computer science, 1 data science, and 1 convergence industry are recommended
- **Doctoral Program**(36 credits): 1 computer, 2 data science, and 2 convergence industries are recommended
- **Combined Master's and Doctoral Program** (60 credits): 2 computer courses, 2 data science courses, and 2 convergence industries are recommended.

## 2. Manpower Development Plan and Support Plan

### 2.1. A plan to secure and support excellent graduate students of the Education Research Group

#### ■ Plan to secure excellent graduate students

- Operation and promotion of various participation-inducing programs for undergraduates
  - Providing graduate school information and experience opportunities through open lab events
- Attracting outstanding students by securing the scholarship system
  - Providing research assistantship (RA) through the participation of supervisors in research
  - Providing opportunities for Ph.D. student research incentives (20 million won/year)
- Attracting outstanding students through exchanges with overseas universities
  - Utilization of programs to support overseas training activities for general graduate students
  - Attracting outstanding students through cooperation with universities that sign MOUs
  - Attracting outstanding students through cooperation with universities signing agreements for joint training programs for Ph.D. programs
  - After a doctoral degree from Chonnam National University, strengthen the network of graduates working as professors in their home countries and attract excellent students from overseas universities using it.

## 2. Manpower Development Plan and Support Plan

### 2.1. A plan to secure and support excellent graduate students of the Education Research Group

#### ■ Plan to support outstanding graduate students

- Incentive payments for outstanding performance related to the new big data/AI industry
  - Incentive system is introduced to provide research incentives to students who publish their papers in the top 10% SCI journal while attending school.
  - The best award from overseas prestigious academic societies or large-scale academic conferences will be given to the winners of academic conferences.
- Support for overseas training activities
  - Development of overseas training program for BK business group
  - Utilization of Chonnam National University Graduate School Project  
(Project to Support Overseas Training for General Graduate School Students)
- Support through student-led big data/AI new industry problem-solving challenge competition
  - Hold industrial big data competition
  - University and participating companies plan challenge issues together
  - Provide participating company internship programs and opportunities to participate in international competitions to top performance teams

## 2. Manpower Development Plan and Support Plan

### 2.2. Graduate Student Academic Activity Support Plan

#### ■ Plan to support academic activities

- Regular academic conferences are held in the business group
  - Open an academic competition for graduate students belonging to a business group:
    - Presentation of a thesis on a degree in preparation
  - Provide feedback on the presentation of the dissertation of the degree
- Support for Article Process Charge(APC)
  - Once a year, fully supporting the paper's materials within KRW 3 million won
- Support expenses for various domestic education programs
  - Support for expenses for in- and out-of-school education programs
- Support expenses for participating in suburban academic conferences
  - Support expenses for participating in academic conferences to outstanding students in the competition.
  - All expenses, including registration fees for domestic academic competitions (within 500,000 won / per person)
  - All expenses, including registration fees for international academic competitions (within KRW 3 million / per person)

## 2. Manpower Development Plan and Support Plan

### 2.2. Graduate Student Academic Activity Support Plan

#### ■ Plan to support research activities

- Overseas university laboratory exchange program
  - Development of student exchange programs for foreign universities' laboratories by new industry's three areas
  - Exchanges with laboratories belonging to experts in foreign fields (US, Italy, China, Canada, UK, Hong Kong, etc.)
- Organization and support of research groups for convergence research on big data/AI
  - Creating a big data/AI research group in the business group
  - Development of a research program for industry-academic cooperation with local-based new industrial enterprises
- Development of a global program specialized in big data/AI
  - Development of internship programs for exchange with world-renowned big data centers
  - Selection of students eligible for internship after fair screening by the department's steering committee
  - Short-term or mid-term dispatch using the vacation period in consideration of the academic work of participating graduate students

## 3. Internationalization Strategy of Education

### 3. Internationalization Plan of Education Programs

#### ■ Internationalization Detail Plan

- Operation of a multiple degree system with foreign universities
  - Expand to more than 10 universities in the future, including 5 currently operating universities
- Joint education program with foreign universities/laboratories/industry companies
  - Support for participation in overseas education (summer school)
- Human exchange plan with foreign research institutes and universities
  - Collaborative research conducted with overseas laboratories
- Planning to utilize renowned foreign scholars in the new industry
  - Invited to seminars on renowned scholars from Italy, China and the United Kingdom
- Plans to attract excellent foreign students
  - Attracting outstanding students by securing the scholarship system
  - Attracting outstanding students through exchanges with overseas universities



### 3. Internationalization Strategy of Education

#### 4. Graduate Student International Joint Research Plan

##### ■ Joint research or overseas training

- Joint study with overseas laboratories
  - Joint research plan with overseas laboratories by participating professors
- Short-term/mid-term overseas training for graduate students
  - Short-term laboratory tour of overseas universities
  - Mid- to long-term exchange students

(utilization of graduate work at Chonnam National University)

#### 2020학년도 일반대학원생 국외연수 지원사업

[대학원혁신본부]

##### 1. 지원목적

- 일반대학원생 국외연수활동 지원을 통해 전공 실력 향상과 연구 역량 증진
- 국외 대학 및 우수 연구기관 간의 교류를 활성화하고 사업 참여 대학원생들에게 전문 분야 교육 기회 제공

### III. Research Competency Area

## 1. Research competence of participating professors

### 1. The Education-Research Group's Research Capability Improvement Plan

- 1) Organize and support research groups for convergence research on big data/AI
- 2) Investigating the participation project of AI Industrial Convergence Complex in Gwangju Metropolitan City
- 3) Support for convergence research in connection with Chonnam National University's Big Data Center
- 4) Strengthen global competitiveness of leading technologies related to big data
- 5) Establishment of an undergraduate trainee system to participate in laboratories early
- 6) Activating the attraction of outstanding overseas talent students

## 2. Status and Planning of Internationalization of Research

### 2.1. Performance and plan of researchers-cooperation with foreign universities and research institutions

#### 1) Performance of researchers-cooperation with foreign universities and research institutions

##### ■ Joint training program agreement for Ph.D. program to recruit excellent researchers.

##### (Onju University (China) - Chonnam National University)

- 25 professors from Chonnam National University and 33 professors from Onju University, including participating professors from this Education Research Group, participated in the joint training program for the Ph.D. program.
- A visit between Chonnam National University and Onju University will be held to exchange professors.
  - Benefit
    - Securing researchers at Chonnam National University
    - Increased awareness of internationalization by strengthening research exchanges between Korea and China
    - Applications for Korea-China national projects can be made in the future.
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## 2. Status and Planning of Internationalization of Research

### 2.1. Performance and plan of researchers-cooperation with foreign universities and research institutions

#### 1) Performance of researchers-cooperation with foreign universities and research institutions

##### ■ Agreement for a Ph.D. program in pharmacy to establish medical big data (Onju University of Medicine (China) - Chonnam National University)

- Twelve faculty members, including the participating professors of this Education Research Group, visit the Onju University of Science and proceed with the conclusion of an agreement for exchange students and academic exchanges.
- Major matters to be discussed between the two schools when visiting for exchange agreements
  - Suggestion of Chonnam National University
    - Activating specific and in-depth exchanges, including mathematical statistics
    - Students can participate in the summer/winter international school program, and the 2+2 joint degree system can be applied to all fields.
    - Students with master's and doctorate degrees will be exempted from tuition fees for the first semester and will be provided with tuition fees from the second semester.
    - Full scholarship support for Dr. Misoji and strengthen exchange and cooperation with the Medical Robot Research Institute.
    - Hope to visit Chonnam National University and hope for deep and wide exchange and cooperation in the future

## 2. Status and Planning of Internationalization of Research

### 2.1. Performance and plan of researchers-cooperation with foreign universities and research institutions

2) A plan to exchange researchers with foreign universities and research institutions

#### ■ Development of Exchange Program with Overseas University Laboratory

Field	Nation	Cooperation university
Medical Big Data	USA	Wayne State University
	USA	University of Miami
	Italy	University of Florence
Financial Big Data	China	Renmin Universit of China
	China	University of International Business and Economeics
	Canada	University of British Columbia
	UK	University of NewCastle
	UK	Nottingham University
Image Big Data	Australia	Deakin University
	Hong Kong	Polytechnic University of Hong Kong
Biomedical Big Data	China	Wenzhou University
Agricultural Big Data	China	Wenzhou University

## 2. Status and Planning of Internationalization of Research

### 2.1. Performance and plan of researchers-cooperation with foreign universities and research institutions

#### 2) A plan to exchange researchers with foreign universities and research institutions

##### ■ Establishment of overseas base network for international cooperation

- Securing a bridgehead for overseas exchanges by signing MOUs to develop joint education programs and promote academic exchanges with outstanding universities abroad
- Establish network through regular academic exchange workshops with outstanding universities overseas
- Establish network with leading foreign companies for field experience
- Looking forward to creating a foundation for innovation in the internationalization field by establishing overseas base network

##### ■ Expanded cooperations with leading overseas companies / Big Data centers

- Development of Internship Program for Exchange with World-famous Big Data Centers
- Expand exchanges with excellent overseas companies through participation in national-run internationalization projects
- Expand exchanges with excellent overseas companies through participation in our university's internationalization project (Target program: "Global Overseas Dispatch", "Dispatched Exchange", "International International", etc.)

#### IV. Industry-Academic Cooperation Area



# 1. Industry-Academic Joint Curriculum

## 1.1 Joint Industry-Academic Curriculum Organization and Operation Plan

### 1) Organization and operation of industry-academic cooperation training programs

- Operate field-based curriculum such as graduate student internships and industry-academic cooperation projects linked to new big data industries through a consortium of industry-academic-academic-academic cooperation in the region.
- Signing MOUs with companies through 'Big Data Capstone Design' course and linking them to field practice
- Improving graduate students' ability to cooperate internationally by attending international seminars and academic competitions, including overseas industrial field experience programs, and conducting joint research projects.

### 2) Configure and operational cooperation between Big Data Committee.

- Discover and activate new big data-linked industry-academic cooperation projects



# 1. Industry-Academic Joint Curriculum

## 1.1 Joint Industry-Academic Curriculum Composition and Operation Plan

### 3) Development of customized human resources through field training courses and curriculum development



### 4) Strengthen demand-oriented industry-academic cooperation that reflects the needs of enterprise sites

- The opinions of the Industrial-Academic Cooperation Committee established as working-level officials and executives of participating companies and consumers' companies are actively reflected in educational goals and curriculum construction.
- In order to foster practical field experts, basic and key subjects related to big data are strengthened and operated, and various practical project subjects are operated to foster practical problem-solving skills based on theory.
- By combining theoretical training through flip learning and practical-project training, they develop a sense of practice and develop the ability to solve problems that arise in real industrial sites. Field experts from demand companies participate in theoretical and hands-on training to strengthen practical performance capabilities

# 1. Industry-Academic Joint Curriculum

## 1.1 Joint Industry-Academic Curriculum Composition and Operation Plan

### 5) The operation and support of domestic industry-academic cooperation-oriented comparison and education programs

- Promote field-oriented education in Korea and expand to global human resource development program
- Promoting the expansion of employment-linked internships after field training for long and short-term students
- Operation of mentoring system using industry-academic internships, industry-academic cooperation projects/businesses and experts from related organizations
- Conduct weekly academic and technical seminars on technology development occurring at industrial sites to encourage graduate students to acquire abundant knowledge in related fields.

### 6) Expansion of Support for the spread of industrial technology performance

- Through matching, participants in joint industry-academic cooperation projects are selected and related common/professional curriculum is induced.
- Industrial-academic cooperation practical projects support excellent teams with industrial field experience programs, including overseas internship/field training, and link them to careers after graduation.
- Conducting intellectual property rights and research papers as research achievements and spreading performance to corporate technology transfer.
- Establish a foundation for future commercialization and commercialization of projects and spread performance through self- and corporate-level promotion of outstanding performance.

# 1. Industry-Academic Joint Curriculum

## 1.1 Joint Industry-Academic Curriculum Composition and Operation Plan

### 7) Planning and operation of overseas field-oriented education programs

- Operate overseas internships and joint projects focusing on organizations within the university (International Cooperation Headquarters, etc.).
- Conducting practical human resource nurturing education through MOUs to provide practical training for human resources based on graduate student exchange and joint project performance institutions
- Select companies that want job openings by conducting overseas internships and projects, and link graduate students with industrial recruitment
- Support for international seminars, academic conferences, and research presentations to foster convergence capabilities related to new big data industries

## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

#### ■ Performance of Human/Material Exchanges between Industries and Academies

##### ○ Performance of Local Government Research Projects at Chonnam National University Big Data Center

- Since 2016, various local governments in Jeollanam-do have conducted social surveys and results analysis services every year.
- University students collect data, analyze data, process, and result technology → High field training.
- College students play a leading role in writing reports to their local governments → Very high achievement

Year	Research Topics	Local government	Total Research Fee
2017	Analysis of Social Survey Results in Jeollanam-do	6 cases including Gurye, Yeonggwang, Yeongam, Jangseong, Jindo, and Hampyeong	44,540,000
2018		8 cases including Gokseong, Gurye, Damyang, Yeonggwang, Yeongam, Jangseong, Jindo, and Hampyeong	59,900,000
2019		7 cases including Gokseong, Gurye, Damyang, Yeonggwang, Yeongam, Jangseong, and Hampyeong	52,800,000

## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

#### ■ Performance of Human/Material Exchanges Performance among between Industries and Academies

##### ○ Performance of cooperation exchanges with KEPCO and KPS

- Development of Algorithm to Measure Residual Capacity of Chemical Batteries in Real-Time Jointly with KEPCO KPS
- A thesis will be published in SCI Journal through research on the synthesis of drone images of solar panels in order to develop defect recognition program, which is a major problem of KEPCO.

##### ○ Performance of exchanges related to agricultural big data

- Implementation of research services for stabilizing supply and demand of agricultural products and development of growth index
- Development of analysis engine for efficient crop production based on machine learning/deep learning
- Carrying out the task of developing a crop prediction model based on big data
- Agricultural Big Data Conference held recently 2 times



## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

Strategies to promote human/material exchanges between industry and academia

#### ■ Establishment of integrated support system for big data industry-academic cooperation

- Establishment of an integrated support system and revitalization of industry-academic cooperation through the Big Data Industry-Academic Cooperation Committee

#### ■ Establishment of a cooperative system with local governments and organizations related to the new big data industry

Project Discovery

Abroad internship

Fostering convergence  
talented student

Participate in the project

#### ■ Establishment of a cooperative system with local governments and organizations related to the new big data industry

- Currently, the role of big data centers belonging to industry-academic cooperation organizations is expanded  
(city and county → metropolitan governments, government agencies)

## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

Strategies to promote human/material exchanges between industry and academia

#### ■ Reinforcement of Human Exchange through Industrial-Academic Cooperation Based on Regional Networks and Demand Discovery

- Operate an industrial cooperation program where state-of-the-art schools go to companies that need that technology to identify and resolve problems.
- Generating a virtuous cycle structure in which local government's support funds are invested into local governments by utilizing the amount of self-supporting money provided by industrial-academic cooperation to excavate demand.
- Establishing a joint research based on mutual cooperation and internship operating system through organic cooperation with institutions that are engaged in industry-academic cooperation projects in schools
- Work with start-up support departments such as local governments' start-up childcare centers to support innovative start-up programs that link industry-academic connections to start-ups and establish a system for human resources exchange with companies in Gwangju and Jeollanam-do.

#### ■ Participation in AI Industrial Convergence Complex Project and Strengthening Human Exchange in Gwangju Metropolitan City

- Participate in AI Industrial Convergence Complex Project => Expanding Industry-Academic Cooperation Network
- Improve research conditions and form a research group for convergence research by utilizing advanced equipment



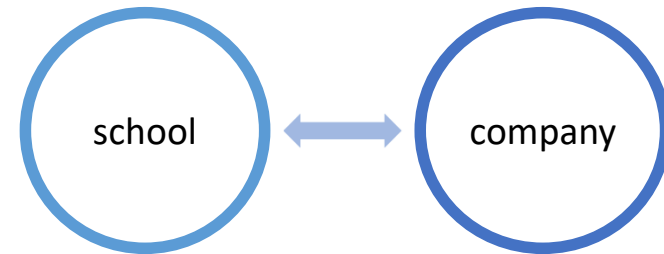
## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

Strategies to promote human/material exchanges between industry and academia

#### ■ Establishment of programs to link labor exchanges and cooperation between schools and businesses

- From Business to School: Link Academic to Recruitment
  - Supporting employees and employment contract-type admission programs for enterprises that have entered into agreements.
- From school to business: research-project-internship-employment links
  - continuously conducted to companies to operate industry-academic cooperation programs so that schools, students, and companies can win.



#### ■ Expanding human exchanges by establishing a network of big data centers

- Link to improved employment by signing MOUs with organizations that own big data centers to develop field training (Intern) curriculum and discover joint cooperative research projects
- Organizations that specialize in big data: Shinhan Bank, Korea Credit Viewro Co., Ltd., KB Kookmin Bank, Hana Financial TI, CJ Olive Networks, KT, SKT, LG Uplus, LG-CNS, Coscom, Bituen, Samsung SDS, Korea Energy Corporation, and Electronics Research Institute.
- Performing an active role at Chonnam National University level related to AI (Artificial Intelligence) centered industrial convergence complex in Gwangju through the "Big Data Center" of the Industrial-Academic Cooperation Group

## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

#### Strategies to promote human/material exchanges between industry and academia

##### ■ Expanding demand-driven industry-academic cooperation based on [BIG DATA Technology + Agriculture]

- ◆ Korea Agro-Fisheries and Food Distribution Corporation  
(2013.7.2. Signed the Agreement on the Promotion of Exchange and Cooperation)
- ◆ Korea Rural Community Corporation  
(May 12, 2015. Agreement for Promotion of Exchange and Cooperation)
- ◆ Jeollanam-do Agricultural Technology Institute (December 31, 2015.  
Signed an agreement to operate an industry-academic cooperation program)
- Development of complex price index for major vegetables  
(Agriculture and Fisheries Distribution Corporation)
- Development of agricultural abnormal climate index  
(Agriculture and Fisheries Distribution Corporation)
- Research on ICT-based stable export ship production model (Export business group)
- Demonstration study on establishing a smart farm model (Export business group)

##### ■ Expanding demand-driven industry-academic cooperation operations based on [BIG DATA Technology + Finance]

- ◆ Gwangju Bank (1996.09. Industry-School Education Research Agreement) :  
Graduate student field training, etc.
- ◆ Korea Development Bank's Korea Development & Technology Evaluation Institute  
(2006.03. signing a business agreement) to train customized professionals
- ◆ Korea Development Bank (KDB signed a working-level exchange agreement) :  
human and physical exchange, etc.
- Chonnam National University Social-tailored Industry-Academic Cooperation  
Promotion Project (Gwangju Bank)
- Student selection, education program design, field practice joint participation  
(Gwangju Bank)

## 2. human/material exchanges between industry and academia

### 2.1 Human/Material Exchange Performance and Planning between Industries and Academies

#### Strategies to promote human/material exchanges between industry and academia

##### ■ Expanding demand-driven industry-academic cooperation operations based on [BIG DATA technology + healthcare, medicine]

- ◆ Gwangju Veterans Hospital (2013.01. Signing a working-level cooperation agreement)  
Field training for graduate students, etc.
- ◆ Matters concerning industry-academic cooperation, etc. at Naju National Hospital (2013.05. Signing a working-level cooperation agreement), etc.
- Establishment and application of medical big data platform for patients with heart failure (Chonnam National University Hospital)
- Quality management of medical big data and effective information service establishment (Jeonnam University Hospital)
- Verification of treatment efficacy and side effects using human heart organoids (Jeonnam National University Hospital)
- Development of AI algorithms that can improve the accuracy of heart failure in ECG examinations (Jeonnam National University Hospital)

##### ■ Expanding demand-driven industry-academic cooperation operation based on [BIG DATA technology + energy]

- ◆ KEPCO KDN  
(2018.8.6. Convention for Promotion of Exchange and Cooperation signed)
- ◆ Korea Electric Power Corporation (November 3, 2016)
- ◆ KEPCO KPS Co., Ltd.  
(2016.2.16. Signed a mutual R&D capacity strengthening agreement)
- KEPCO KPS Co., Ltd. - State of Health (SOH) study of batteries
- Blockchain-based housing surplus power transaction system  
(Korea Electric Power Exchange)
- Detection of abnormal energy CPS behavior based on machine learning  
(Korea Electric Power Corporation)
- A comparative study on domestic and foreign energy CPS technical inspection items  
(KDN Co., Ltd.)