Course Detail

1. Course Title: Master of Science Program in Smart City Management and Digital Innovation

2. Degree: Master of Science (Smart City Management and Digital Innovation) /
M.S. (Smart City Management and Digital Innovation)

3. Academic Institution: Naresuan University,
School of Renewable Energy and Smart Grid Technology (SGtech)

4. Duration: Two (2) Years

5. Language: ☐ English ☑ Bilingual (Thai-English)

6. Background and Rational:

Developing opportunities and social equality can be achieved by applying digital technology in city management and providing facilities to make it a safe and convenient smart city for all with thorough and environmentally friendly.

Hence, to promote city potential and opportunities development through participation and investment of the private sector, communities, and civil society. It is encouraging local administrative organizations to be primarily responsible for the quality of the environment and the quality of life of the people in the city and reducing the disparity between the population living in urban areas. Therefore, it must have knowledge and understanding of the various components of a smart city that consist of Smart Economy, Smart Mobility, Smart Energy, Smart Environment, Smart Governance, Smart People, and Smart Living.

The program aims to encourage and develop our students to systematically integrate knowledge for their research and Smart City development application to create safety quality of life and society of the country, region, and the world.

7. Objectives:

7.1 Demonstrate knowledge and skills related to:

- Smart city infrastructures and smart city platforms
- Applications of information and communication technology (ICT) for smart city
- Smart city knowledge development and organization development with digital technology applications

7.2 Strengthen the links and active cooperation between smart city management and digital innovation for the nation's benefit.

7.3 Seek life-long training and creative researches for smart city development.

7.4 Full of ethics, morals and social responsibility.

8. Course Synopsis and Methodology:

The course will be taught in English. In addition, the students must write a thesis emphasizing high-quality research.

Structure of the Program

1. Credit Requirement.*

Requirements	Plan A Type A2
Coursework	24
- Core Courses	9
- Electives	15
Required Non-Credit courses	5
Thesis	12
Independent Study	-
Total	**36**

***** Minimum credits required.

2. Core Course

Requirements	Plan A Type A2	
	Course No.	Credits
Infrastructure for Smart City	854501	3
Information and Communication Technology in Smart City	854502	3
Sustainability Smart City Management	854503	3
Total	**3**	**9**

3. Electives

Requirements	Plan A Type A2	
	Course No.	Credits
Smart City Economic	854511	3
Smart Farm	854512	3
Innovation Management for Smart City	854513	3
Digital Economy	854514	3
Feasibility Study and Business Plan for Smart City	854515	3
Smart Environment	854516	3
Smart Energy	854517	3
Smart Mobility	854518	3
Microgrid System	854519	3
Built Environment and Sustainability	854520	3
Urban Management and Development	854521	3
Urban Design for Smart City	854522	3
Universal Design for Smart City	854523	3
Smart People	854524	3
Computer Applications in Health Care	854525	3
Big Data Analytics in Smart City	854526	3
Cyber Security	854527	3
BlockChain Technology	854528	3
Software Development and ICT-Based Innovations for Smart City	854529	3
Internet of Things (IoT) for Smart City	854530	3
Special Topics in Digital Innovation Application for Smart City	854531	3
Total	**20**	**≥ 15**

4. Required Non-Credit Courses.

Requirements	Plan A Type A2	
	Course No.	Credits
Research Methodology in Science and Technology	854571	3
Seminar 1	854572	1
Seminar 2	854573	1
Total	**3**	**5**

5. Thesis Credit Requirements.

Requirements	Plan A Type A2	
	Course No.	Credits
Thesis 1, Type A2	854591	3
Thesis 2, Type A2	854592	3
Thesis 3, Type A2	854593	6
Total	**3**	**12**

8.1 Study Plan

The first year

- First Semester

Requirements	Plan A Type A2	
	Course No.	Credits
Research Methodology in Science and Technology	854571	Non-Credit
Infrastructure for Smart City	854501	3
Information and Communication Technology in Smart City	854502	3
Sustainability Smart City Management	854503	3
Total	**4**	**9**

- Second Semester

Requirements	Plan A Type A2	
	Course No.	Credits
Elective Course	854xxx	3
Elective Course	854xxx	3
Thesis 1, Type A 2	854591	3
Seminar 1	854572	Non-credit
Total	**4**	**9**

The second year

- First Semester

Requirements	Plan A Type A2	
	Course No.	Credits
Elective Course	854xxx	3
Elective Course	854xxx	3
Thesis 2, Type A 2	854592	3
Seminar 2	854573	Non-credit
Total	**4**	**9**

- Second Semester

Requirements	Plan A Type A2	
	Course No.	Credits
Elective Course	854xxx	3
Thesis 3, Type A 2	854593	6
Total	**2**	**9**

8.2 Course Content/Study Topic:

854501 Infrastructure for Smart City 3(2-3-5)

Differences of smart city and community; smart city infrastructures and smart city platforms; environments of smart city; core components of smart city; information system; utilization of information system and digital data communication for smart city; case studies on infrastructure for smart city

854502 Information and Communication Technology in Smart City 3(2-3-5)

Applications of information and communication technology (ICT) for smart city; components of infrastructure and smart city platform; communication protocol and network system; internet of things (IoT); privacy and information security; case studies on application of ICT for smart city

854503 Sustainability Smart City Management 3(2-3-5)

Smart city knowledge development; community development concept analysis in various system of smart city; policy and strategy for smart city; organization development with digital technology applications; human resource management and development; case studies on sustainability smart city management

854511 Smart City Economic 3(2-3-5)

Market structure; concept of circular economy; demand and supply analysis of production process; cost and benefit analysis; concept of a consumer's willingness to pay; policy of business, politic and social implications of smart city innovations; data analytics and solution development; scoping and measuring impacts in economic and social context of micro and macro aspect of smart city

854512 Smart Farm 3(2-3-5)

Smart farm management via smart city platform; agribusiness system; applications of digital technology for safe agricultural product control; using and accessing infographic technology of farmer; agricultural data analytics; agrimonitor system; internet of thing (IOT) for smart farm

854513 Innovation Management for Smart City 3(2-3-5)

Creative thinking and digital innovation development for smart city platform; assessment of business opportunities; analysis of changes in business trend; innovation management techniques; valuation of innovation; transformation of innovation to business process; business investment analysis; understanding in marketing innovation; conditions of trading and investment

854514 Digital Economy 3(2-3-5)

Digital economy meaning; digital knowledge economy; digital commerce; digital transformation; platform competition; digital externalities; digital technology for consumption; ethics of information professionals; intellectual property rights; mergers in digital market

854515 Feasibility Study and Business Plan for Smart City 3(2-3-5)

Concept and technique of business strategic planning; business planning component; feasibility study for smart city projects; implement the business plan; research for digital marketing; related tools; sensitivity and risk analysis; evaluation of economic; societal and environmental impacts of the projects; case studies of success and failed business models

854516 Smart Environment 3(2-3-5)

Structure and functional analysis of environmental system; assessment of environmental change; applications of technology and digital innovation for systematic environmental management; water management; waste management; disaster monitoring and environmental management plan

854517 Smart Energy 3(2-3-5)

Applications of technology and digital innovation for energy planning, energy management in smart city; demand response; energy security; energy system economic analysis

854518 Smart Mobility 3(2-3-5)

Smart mobility system analysis and design; applications of technology and digital innovation for smart mobility system development; increasing of transportation system

linkages and efficiency in smart city; increasing of convenient and secure eco-friendly transportation

854519 Microgrid System 3(2-3-5)

Smart city load profile; electrical production on grid connected system and stand-alone system; smart city microgrid infrastructure; electricity production management by information and communication technology (ICT) for smart city; distribution system; development of microgrid system based on with national policy; developing potential and trends of microgrid system in the present, future and domestic, foreign countries

854520 Built Environment and Sustainability 3(2-3-5)

Concepts of sustainability and expected characteristics of architecture according to sustainability concepts; ideas and practices of efficient use of energy, renewable energy, and other resources in architecture and manmade environment; examination of renewable energy; roles of designers and architects on environmental conservation and creation of sustainability through professional practice

854521 Urban Management and Development 3(2-3-5)

Theories in urban development and quality of life; theories and strategies in urban development; legislative and incentive measures in urban development; urban infrastructure finance and management; processes and techniques in urban resource management; urban economics and land policy; participatory approach in urban development process; good governance; disaster preparedness; analyzing urban development policies and governance structure in relevance to local conditions

854522 Urban Design for Smart City 3(2-3-5)

Concepts and current debates around smart city development; components of smart city development that related to urban environments; concepts and in-depth analysis of urban development challenges; the importance of the role of different stakeholders including government, local authorities, business, universities and communities; data analysis for urban innovation design; transmission of smart urban data system with digital platform; smart city simulation; model of smart city development in the future

854523 Universal Design for Smart City 3(2-3-5)

Architectural design that respond to society function; applications of digital technology for all function and safety; study of building function limitations; comparative analysis of concept of architectural design for society; building control law

854524 Smart People 3(2-3-5)

Development of lifelong learning knowledge, skills and environment by using digital technology; social inequality reduction; increasing of data accessibility opportunity; applying digital technology for economic development; creating shared value for sustainable development

854525 Computer Applications in Health Care 3(2-3-5)

Information system for health care using digital platform; application of artificial intelligence for health monitoring; health problem analysis from big data for sustainable health care

854526 Big Data Analytics in Smart City 3(2-3-5)

Concept of big data; big data Infrastructure; big data analysis; big data analytics tools and techniques; analysis of big data applying in multiple platform; challenges of big data applying in smart city management; applying big data for smart city management; case studies on applying big data for smart city

854527 Cyber Security 3(2-3-5)

Concept of security; introduction to cyber security; cyber security and privacy; cyber security metric; security risk assessment and mitigation techniques; penetation testing concept; cyber security implication; cyber security breach prevention; case studies of cyber security

854528 BlockChain Technology 3(2-3-5)

Concept of blockchain technology; distributed systems and alternative consensus; cryptoeconomics and proof-of-stake**;** blockchain architechure; cryptocurrencies; standard related to blockchain technology; regulation and anonymity; case studies of real-world blockchain-related application

854529 Software Development and ICT-Based Innovations for Smart City 3(2-3-5)

Concept of software architect in smart city environment; principles of software design and development; functional requirements and constraints; software modelling; web services standards; interface design; interaction models; tools, software development trends in smart city and case studies; definition of innovation loyal and impact of digital innovation; classification of innovation; component of innovation; life cycle of innovation; case studies of innovations in smart city

854530 Internet of Things (IoT) for Smart City 3(2-3-5)

Principle of internet of things (IoT); characteristics of smart city and IoT; integrating smart city and IoT; IoT and related technologies; IoT market perspective; IoT design limitations; IoT data management and analytics; IoT architecture; security and privacy issues; IoT application and case studies on challenges of IoT for smart city

854531 Special Topics in Digital Innovation Application for Smart City 3(2-3-5)

Studying and discussion of new technology and innovation applied in the area of smart city management

853571 Research Methodology in Science and Technology 3(3-0-6)

Research definition, characteristic and research goals; types and research processes; research problem determination; variables and hypothesis; data collection; data analysis; proposal and research report writing; research evaluation; research application; ethics of researcher; proper techniques of research methodology in science and technology

853572 Seminar 1 1(0-3-1)

Emphasize on encouraging students to learn how to search, criticize the articles and published papers, and practice the oral presentation on selected topics of current research or thesis progress in smart city management and digital innovation

853573 Seminar 2 1(0-3-1)

Presentation and discussion of current research topics related to smart city management and digital innovation with precise topic and content

854591 Thesis 1, Type A 2 3 credits

Study the elements of thesis or thesis examples in the related field of study; determine thesis title; develop concept paper, and prepare the summary of literature and related research synthesis

854592 Thesis 2, Type A 2 3 credits

Develop research instruments and research methodology and prepare thesis proposal in order to present it to the committee

854593 Thesis 3, Type A 2 6 credits

Collect data, analyze data, prepare progress report in order to present it to the thesis advisor, and prepare full-text thesis and research article in order to get published according to the graduation criteria

9. Graduation Condition: In accordance with the Graduate School Rules and Regulations.

10. Applicant Qualification:

Qualification for Admission

Plan A Type A2

This program is open to applicants who have a Bachelor degree in any relevant field, or are in the final semester of their study

11. Document Required:

Applicant can fill required information in the application form and send it with these enclosed document:

1. The Application Form affixed with colored photographs.
2. A letter of recommendation or a reference
3. A copy of Educational certificate
4. A copy of an Academic transcript
5. A copy of Personal Identity Card or Official Staff Card.
6. A copy of English languages certificates e.g. TOEFL, IELTS, TOEIC or CU-TEP or NULC (if any)
7. Document to certify change of name or surname and/or marital status (if any).
8. Other supporting document

12. Contact:

School of Renewable Energy and Smart Grid Technology (SGtech)
Naresuan University
Phitsanulok, THAILAND 65000
Tel. : +66 96 3180, 96 3181
Mobile : +66 65 592 4423
E-mail: sgtech@nu.ac.th
Website: http://sgtech.nu.ac.th
Facebook: http://www.facebook.com/nu.sgtech