

Theme: Metrology in Electricity and Magnetism (EM)

Dates: June 13 (Mon) - 24 (Fri), 2016

Venue: Korea Research Institute of Standards and Science (KRISS), Daejeon, Korea

Organized by: Global Metrology Academy (GMA), KRISS

Overview

(GMA-GT-2016-03-EM)

The Global Metrology Academy of KRISS offers group courses to meet the needs of metrology HRD of the customers both at home and from abroad who are responsible for metrology and related functions of national quality infrastructure of the nation. The course [GMA-GT-2016-03-EM] might be last one to be offered in 2016. Its main theme is metrology in Electricity and Magnetism (EM), to be presented in four (4) technical modules covering the fundamentals of metrology in electricity and magnetism, including DC/AC voltage and power, resistance and impedance, high voltage and high current, and magnetic field. With its main target audience of intermediate level of metrologists in electricity and magnetism, the EM course will deliver the concepts of the traceability and measurement standards along with other key subjects of metrology in electricity and magnetism that participants need to obtain for their future career as leaders in their local and global metrology communities.

As an effort to yield as more practical benefits as possible for participants, each session of the EM course is strategically designed that technical lectures are effectively combined with hands-on laboratory sessions to follow. By the end of the course, participants might have better understanding of basic knowledge, skills, and information as up to dated on the key elements of metrology in electricity and magnetism. It will enable them to offer better measurement services for their customers. In addition, participants will be given a two-day session of metrology in general to learn selected fundamental subjects of metrology, such as QMS (ISO/IEC 17025) and the CIPM MRA requirements covering key comparison (KC), calibration and measurement capabilities (CMC), traceability and uncertainty in measurement.

Outline of Course program *(* Subject to Modification!)*

Modules	Subjects	Chief Lecturers
Orientation	Introduction and brief tour <small>(* to be offered for participants who will have arrived by Friday, 10th of June 2016)</small>	GMA
MiG (Days 1-2)	Metrology in General - Five (5) lectures dealing with the fundamentals of metrology in general	Dr. Chu-Shik KANG (cshkang@kriss.re.kr)
EM-01 (Days 3-4)	DC/AC Voltage and Power	Dr. Moon-Seog KIM (msk2003@kriss.re.kr)
TV (Days 5-6)	Technical visit & cultural experience in Seoul (* to be confirmed)	GMA
EM-02 (Day 8)	Resistance and Impedance	Dr. Wan-Seop KIM (ws2kim@kriss.re.kr)
EM-03 (Day 9)	High Voltage and High Current	Mr. Sang Hwa LEE (shlee@kriss.re.kr)
EM-04 (Day 10)	Magnetic Field	Dr. Po-Gyu PARK (pgpark@kriss.re.kr)
EM (Days 11-12)	Performance Evaluation Test, Individual Lab Visits, Closing	GMA

Official language of the course: English
(interpretation service is not available.)

At the end of the course, participants will become familiar with fundamental knowledge on the fundamental subjects of measurement standards, traceability, calibration and uncertainty in the fields of metrology in electricity and magnetism. Intensive laboratory sessions (ILS) are effectively combined with lectures and hands-on exercises in ways that allow participants to obtain basic skills required for offering quality services for customers. A two-day session of metrology in general (MiG) will offer participants broad perspectives that will help them grow up to be the key players in advancing the nation-wide measurement system up to the international level.

Metrologists who are working on R&D and services relating to the technical areas of metrology in electricity and magnetism

Knowledge and skills to be obtained

Who should

Applications

Applications to be accepted: by April 30, 2016

Welcome to be Partners of Global Metrology Academy!

Modules, Lectures, Hands-on Exercises

** subject to modifications*

June 10 (Fri)	Arrival at Daejeon, check-in at the Hotel Graytone in Daejeon	recommended date of arrival at Daejeon, Korea
June 11 (Sat)	Orientation & Brief tour in and around Daejeon city	10:00-17:00 (provisional)
June 12 (Sun)	Free	
MiG	Metrology in General: fundamentals of metrology and quality	June 13 (Mon) - 14 (Tue)
	Five (5) lectures and exercises (uncertainty evaluation)	Lecturers
DAY 1 (Mon) June 13	MiG-01: National Standards System in Korea-quality infrastructure	Prof. Dr. Gun-Woong BAHNG, SUNY KOREA
	MiG-02: QMS, why and for what: management/technical requirements (ISO/IEC 17025)	Dr. Hun-Young SO, SHIMADZU, Korea
	MiG-03: QMS in Practice at KRIS	Dr. Jongseon PARK, KRIS
DAY 2 (Tue) June 14	MiG-04: KC-CMC-Traceability in Measurement	Dr. Chu-Shik KANG, KRIS
	MiG-05: Uncertainty in Measurement	Dr. Chu-Shik KANG, KRIS
EM	Metrology in Electricity and Magnetism	June 15 (Wed) - 16 (Thu), June 20 (Mon)-23 (Thu)
	Intensive Laboratory Session (ILS) with lectures and exercises	(L) Lecture, (H) Hands-on exercises
EM-01	DC/AC Voltage and Power	June 15 (Wed) - 16 (Thu)
DAY 3 (Wed) June 15	(EM-1-L-1) DC Voltage Standards and Traceability (I)	Dr. Kyu-Tae KIM, KRIS
	(EM-1-L-2) Electrical power and traceability	Dr. Moon-Seog KIM, KRIS
	(EM-1-L-3) DC Voltage Standards and Traceability (I)	Dr. Moon-Seog KIM, KRIS
	(EM-1-H-1/2) Calibration of DC voltage/Power	Dr. Moon-Seog KIM & Ms. Heh Ree CHO, KRIS
DAY 4 (Thu) June 16	(EM-1-L-4) AC Voltage Standards and Traceability	Dr. Hyung Kew LEE, KRIS
	(EM-1-L-5) AC Current Standards and Traceability	Dr. Hyung Kew LEE, KRIS
	(EM-1-H-3/4) Calibration of AC Voltage and Current	Dr. Hyung Kew LEE & Ms. Chithrani, KRIS
DAY 5 (Fri) June 17	Technical and industrial visits	GMA (staying overnight in Seoul)
DAY 6 (Sat) June 18	Cultural experience in Seoul	Coming down to Daejeon
DAY 7 (Sun) June 19	Free	
EM-02	Electricity and Magnetism (Resistance and Impedance)	June 20 (Mon)
DAY 8 (Mon) June 20	(EM-2-L-1) QHR Standards and Traceability	Dr. Dong Hun CHAE, KRIS
	(EM-2-L-2) AC Current Standards and Traceability	Dr. Wan-Seop KIM, KRIS
	(EM-2-H-5/6) Calibration of AC Voltage and Current	Dr. Kwang Min YU, Kwon Soo HAN, KRIS
EM-03	Electricity and Magnetism (High Voltage and High Current)	June 21 (Tue)
DAY 9 (Tue) June 21	(EM-3-L-1) AC HV Standards and Traceability	Mr. Sang Hwa LEE, KRIS
	(EM-3-L-2) AC HC Standards and Traceability	Mr. Sang Hwa LEE, KRIS
	(EM-3-H-7/8) Calibration of High Voltage/Current	Mr. Sang Hwa LEE & Dr. Jeon Hong KANG, KRIS
EM-04	Electricity and Magnetism (Magnetic Field)	June 22 (Wed)
DAY 10 (Wed) June 22	(EM-4-L-1) Magnetic Field Standards and Traceability	Dr. Po-Gyu PARK, KRIS
	(EM-4-L-2) Magnetic Materials and Applications	Dr. Sungjung JOO, KRIS
	(EM-4-H-9) Generation & Measurement of Magnetic Field	Dr. Po-Gyu PARK & Mr. Young Gyun KIM, KRIS
	(EM-4-H-10) Calibration of Magnetic Field	Mr. Young Gyun KIM, KRIS
EM	Evaluation Test, Individual Lab Visits, Action Plan Development	June 23 (Thu)
DAY 11 (Thu) June 23	Performance evaluation test	Participants, GMA
	Individual lab visits	Participants
	Development and Presentation of Action Plans	Participants, GMA
EM	Wrap-up and Closing	June 24 (Fri)
DAY 12 (Fri) June 24	Course Evaluation Closing session	
June 25 (Sat)	Departure: June 25 (Sat)-June 26 (Sun)	* Depending on the flight itinerary

* ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories

Daily Program (Provisional)

Language of the course: English

June 10 (Fri) Arrival at ICN airport, down to Daejeon, Check-in at the Hotel Graytone		
June 11 (Sat) 10:00-17:00	Orientation & Brief tour in and around Daejeon city (for participants who will have arrived at Daejeon by Friday, June 10)	* ride & lunch to be offered by KRISs
June 12 (Sun) FREE		
June 13 (Mon) Opening & Metrology in General (MiG)		Seminar room (#1), Technology Service Bldg
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:00-09:45	Greetings and Introduction to KRISs and the GMA Course	
10:00-10:30	Opening ceremony	Conference room (Admin. Bldg. 2nd floor)
10:30-12:30	MiG-01: National Standards System in Korea-quality infrastructure	Prof. Dr. Gun-Woong BAHNG, SUNY KOREA
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-16:00	MiG-02: QMS, why and for what: management/technical requirements (ISO/IEC 17025)	Dr. Hun-Young SO, SHIMADZU, Korea
16:00-17:00	MiG-03: QMS in Practice at KRISs	Dr. Jongseon PARK, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
June 14 (Tue) Metrology in General (MiG)		Seminar room (#1), Technology Service Bldg
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	MiG-04: KC-CMC-Traceability in Measurement	Dr. Chu-Shik KANG, KRISs
10:30-11:00	Tea break	
11:00-12:00	MiG-05: Uncertainty in Measurement	Dr. Chu-Shik KANG, KRISs
12:00-13:30	Lunch	KRISs cafeteria (floor 2)
13:30-17:00	MiG-05: Uncertainty in Measurement (including exercises)	Dr. Chu-Shik KANG, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
EM-01	DC/AC Voltage and Power	Seminar room (#1), Technology Service Bldg
June 15 (Wed) Lectures (L), Hands-on Exercises (H)		Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-10:00	(EM-01-L-1) DC Voltage Standards and Traceability (I)	Dr. Kyu-Tae KIM, KRISs
10:00-11:00	(EM-01-L-2) Electrical Power and Traceability	Dr. Moon-Seog KIM, KRISs
11:00-12:30	(EM-01-L-3) DC Voltage Standards and Traceability (II)	Dr. Moon-Seog KIM, KRISs
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(EM-01-H-1/2) Calibration of DC Voltage/Power	Dr. Moon-Seog KIM & Ms. Heh Ree CHO, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
June 16 (Thu) Lectures (L), Hands-on Exercises (H)		Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	(EM-01-L-4) AC Voltage Standards and Traceability	Dr. Hyung Kew LEE, KRISs
11:00-12:30	(EM-01-L-5) AC Current Standards and Traceability	Dr. Hyung Kew LEE, KRISs
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(EM-01-H-3/4) Calibration of AC Voltage/Current	Dr. Hyung Kew LEE & Ms. Chithrani, KRISs
June 17 (Fri) Technical Visit		GMA
09:30-17:00	SAMSUNG Innovation Museum (* to be confirmed) - staying overnight in Seoul	* ride & lunch to be offered by KRISs
June 18 (Sat) Cultural Experiences		GMA
09:00-17:00	Historic sites & cultural attractions (Insa-dong, Gyeong-Bok Palace, Myeong-dong)	* ride & lunch to be offered by KRISs
17:00-19:00	From Seoul down to Daejeon (The Hotel Graytone)	
June 19 (Sun)	Free	

Daily Program (Provisional)

Language of the course: English

EM-02	Resistance and Impedance	Seminar room (#1), Technology Service Bldg
June 20 (Mon)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:30	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	(EM-02-L-1) QHR Standards and Traceability	Dr. Dong Hun CHAE, KRISs
11:00-12:30	(EM-02-L-2) Impedance Standards and Traceability	Dr. Wan-Seop KIM, KRISs
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(EM-02-H-5/6) Calibration of Resistance and Impedance	Dr. Kwang Min YU & Mr. Kwon Soo HAN, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
EM-03	High Voltage and High Current	Seminar room (#1), Technology Service Bldg
June 21 (Tue)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	(EM-03-L-1) AC HV Standards and Traceability	Mr. Sang Hwa LEE, KRISs
11:00-12:30	(EM-03-L-2) AC HC Standards and Traceability	Mr. Sang Hwa LEE, KRISs
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(EM-03-H-7/8) Calibration of AC High Voltage/High Current	Mr. Sang Hwa LEE & Dr. Jeon Hong KANG, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
EM-04	Magnetic Field	Seminar room (#1), Technology Service Bldg
June 22 (Wed)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	(EM-04-L-1) Magnetic Field Standards and Traceability	Dr. Po-Gyu PARK, KRISs
11:00-12:30	(EM-04-L-2) Magnetic Materials and Applications	Dr. Sungjung JOO, KRISs
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-15:30	(EM-04-H-9) Generation and Measurement of Magnetic Field	Dr. Po-Gyu PARK & Mr. Young Gyun KIM, KRISs
15:30-17:00	(EM-04-H-10) Calibration of Magnetic Field	Mr. Young Gyun KIM, KRISs
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
18:30-18:40	From Hotel to Restaurant "La Fiesta"	walking distance (five minutes)
18:40-21:00	Farewell Dinner	"La Fiesta" (* to be confirmed)
21:00-21:10	Return to Hotel	GMA (Sangwook Seo)
June 23 (Thu)	Evaluation Test, Individual Lab Visits, Action Plan development	Seminar room (#1), Technology Service Bldg
09:00-09:30	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	Performance Evaluation Test	
11:00-12:30	Individual lab visits	
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-16:00	Development and Presentation of Action Plans	Participants, GMA
16:00-17:00	Presentation of University of Science and Technology (UST), Korea	Mr. P. G. LEE, UST
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
June 24 (Fri)	Wrap-up & Closing	Conference room (Admin. Bldg. 2nd floor)
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	Evaluation of the course (written and oral)	Participants, GMA
11:00-11:30	Closing ceremony (certificate awarding)	GMA
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-14:30	From KRISs to the Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
June 25 (Sat)	Departure	* depending the flight itinerary of participants

* Participants are supposed to take the airport limousine bus bound for Incheon airport.

* Ride to the bus stop near the hotel will be provided by the Hotel Graytone in cooperation with GMA, KRISs.

Dress code for the farewell dinner: traditional costumes

☺ Participants are recommended to get dressed with their traditional costumes at the farewell dinner scheduled on the evening of June 22 (Wed).

☺ Singing, dancing, and any other type of performance by every participant are strongly encouraged! "Carpe diem!"

Contact Points For further information about participation in the workshop, please contact:

Sangwook SEO, Senior Coordinator, Global Metrology Academy (GMA), KRISs

Dr. Gyeong-Hee NAM, Head, Global Metrology Academy (GMA), KRISs

swseo@kriss.re.kr

ghnam@kriss.re.kr

☐ Qualification

1. The applicant should be duly nominated by the employer, whose official seal and signature should be put on the application/nomination form.
2. The applicant should be an employee of the national metrology institute (NMI) or measurement service laboratory at the time of application.
3. The applicant should be engaged in R&D and services in the areas of metrology in electricity and magnetism (EM).
4. The applicant should be a university/college graduate or have equivalent professional career and knowledge on theme of the course (EM).
5. For the sake of effectiveness, the applicant is required to have a good command of **English**.
6. The applicant should be healthy both physically and mentally enough to go through the whole programs of the course.

☐ Requirements: applications are accepted by April 30, 2016, along with the following requirements.

1. **An official nomination** by the employer with the official seal and the signature of the top management of the employer;
2. A copy of the **curriculum vitae** of the applicant, describing the academic background and professional experience in detail;
3. A copy of **passport** as valid for more than six (6) months as of the expected date of arrival at Korea (June 10, 2016);
4. **Laboratory report and Action Plan**: Selected participants are supposed to submit their laboratory reports and draft action plans according to the template to be provided later on; and
5. Plan of sharing the results of his/her study in the GMA course for their institution and the nation.

☐ Number of participants: each course will be operated with around 10 participants.

Financial Arrangements

- ☐ Participants and their employers are responsible for paying all expenses of the tuition fees, airline tickets, accommodations and meals, etc. required for the participants' travel to and stay in Korea.
- ☐ Lunches for ten (10) working days are offered free to ALL participants.
- ☐ Subject to the availability of fund, additional financial assistance might be discussed for a limited number of people from developing countries.

1. Tuition fees	<p>① Amount: US\$500/US\$1,000 per person</p> <ul style="list-style-type: none"> ☞ Two different categories of the tuition fees are applicable according to the economic performance of the applicant's country. ☞ Please contact the coordinator, BEFORE making applications, to get confirmed of the tuition fee category applicable for you.
2. Banking information	<p>② Applicants are supposed to remit the tuition fees by bank transfer to the official bank account of KRISS.</p> <ul style="list-style-type: none"> ☞ Payment should be made by May 31, 2016 which will make the application complete. ☞ Please make sure that all the handling and banking charges raised both to the remitter and beneficiary should be paid by the remitter, so that the net amount of tuition fees (US\$500 or US\$1,000) could be received by KRISS. <p>Official bank account of KRISS</p> <ul style="list-style-type: none"> - Bank name: Kook-Min Bank (Branch: Yuseong Branch) - Swift code: CZNBKRSE - Account number: 461-01-0184-494 - Account holder's name: Korea Research Institute of Standards and Science (KRISS) - Bank address: 1F, #468-3, Bongmyeong-dong, Yuseong-gu, Daejeon, Republic of Korea <ul style="list-style-type: none"> ☞ invoices will not be issued separately if otherwise requested. (* Receipts might be issued upon the participant's arrival at KRISS.) ☞ The statement of bank transfer should be sent to KRISS either by Email (swseo@kriss.re.kr) or FAX (+82-42-868-5565) with attention to the course coordinator.
2. Living expenses	<p>Participants are responsible for paying living expenses in Korea including accommodations and meals.</p> <p>For selected participants from the developing world, KRISS might provide free accommodations, subject to its financial availability.</p> <p>Lunches for ten (10) working days will be offered free to ALL participants.</p> <p>⑥ Please note that expenses for all other meals shall be paid by the participants.</p> <ul style="list-style-type: none"> ☞ Participants are advised to bring some pocket money of their own for incidental expenses. <p>It is likely that participants will stay at the Hotel Graytone, Dunsan in Daejeon. (http://www.graytone.co.kr/)</p> <p>The room rate (around US\$55 per night per room) includes breakfast, tax, and service charge.</p>
3. Airline tickets	<p>Participants and their employers are responsible for purchasing the airline tickets for the participants.</p>
4. Local Transportation	<p>⑨ The KRISS travel agent will pick up the participants upon their arrival at the Incheon (ICN) international airport of Seoul.</p> <ul style="list-style-type: none"> ☞ Participants are requested to advise the course coordinator of their flight itinerary to and from Korea AS SOON AS Possible. <p>⑩ The KRISS travel agent will help the participants to take the airport limousine bus bound for Daejeon.</p> <ul style="list-style-type: none"> ☞ The bus tickets (around US\$23 one way) are to be bought by the participants. ☞ Upon your arrival at the bus stop in Daejeon ("Government Complex-Daejeon"), the staff of the Hotel Graytone will be meeting you to take you to the hotel.

Every applicant and participant should commit to read, strictly abide by, and respect the following rules and regulations as specified below that GMA endorses in implementing the group course:

1. Participants shall conduct themselves at all times in a manner compatible with their status as participants in the subject GMA course;
2. Participants shall attend, to the best of their abilities, all sessions of the GMA group and/or individual courses they are participating in;
3. Participants shall refrain from engaging in political activity or any form of employment for profit or gain;
4. Participants shall return to their home country upon completion of the subject course of GMA and resume work in their country;
5. Participants shall not extend the length of stay in Korea for personal convenience;
6. Participants whose flights are supported by GMA and other donor organizations are not permitted to change their flights for their personal convenience;
7. Participants shall not be accompanied by any member of their family;
8. Participants shall assume responsibility for any personal expenses incurred regardless of implementation of the course; and
9. Participants are required to strictly observe the course schedule and abide by the **rules and regulations stipulated by the KRISS and their sponsors, and the laws of the Republic of Korea.**
10. Any form of harassment or insult, including but not limited to misconduct arising out of racial/ethnic, gender or class discrimination, whether it be physical or verbal, will not be tolerated and will be dealt with in accordance with the laws of the Republic of Korea and the rules and regulations of KRISS.
11. Especially, **sexual harassment**, defined as a form of behavior characterized by sexually connotative words, acts or gestures that could undermine individual dignity and by which the victim takes offense, is regarded as a serious misconduct and will be dealt with accordingly.
12. Offenders who fail to comply with the above **Rules and Regulations** laws shall be subject to punishment in accordance with the laws of the Republic of Korea and the regulations of KRISS, **which include sending an official letter of complaint to the offender's employer and government and instant deportation with ban of the offender's participation in the future GMA programs.**

**To be a most
Productive & Friendly
Partner in Metrology HRD**

Contact Points

For further information about participation in the GMA course, please contact:

Sangwook SEO (Coordinator) Senior Project Manager, Global Metrology Academy (GMA), KRISS	swseo@kriss.re.kr TEL + 82-42-868-5440 Fax + 82-42-868-5565
Dr. Gyeong-Hee NAM Head, Global Metrology Academy (GMA), KRISS	ghnam@kriss.re.kr TEL + 82-42-868-5412 Fax + 82-42-868-5565