

# KINGS

2025 ADMISSION GUIDELINES

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# ADMISSION GUIDELINES

## ADMISSION POLICY

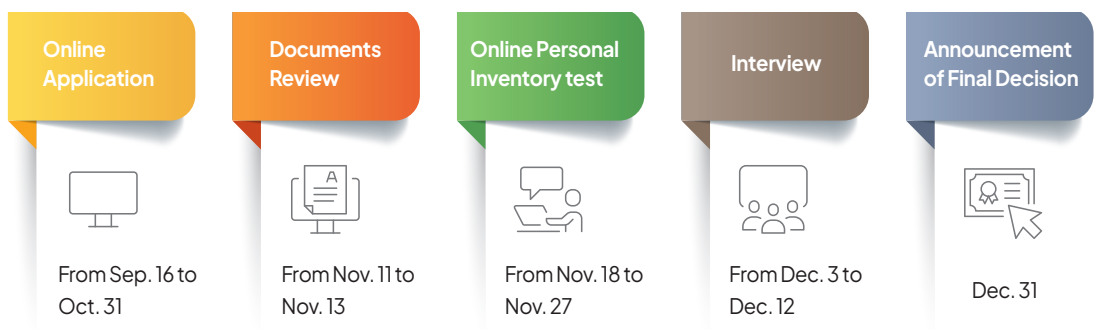
- 🎓 KINGS desires future-oriented and experienced applicants who are working in energy related fields.
- 🎓 Motivated and open-minded individuals are invited to apply.
- 🎓 An ability to study in cross cultural environments is an essential asset for KINGS admission.
- 🎓 KINGS is an accredited Institution by the Ministry of Education of Korea.

## ADMISSION CRITERIA

Eligibility criteria such as academic background, work experience, letter of recommendation, and language requirement is described in table below.

Requirement	Details
Academic Background	Bachelor's Degree or Higher
Work Experience	+1 Year Preferred
Letter of Recommendations	Company, Government or Academic Supervisor
Language Requirement	Certified English Test Score or Equivalent Language Proficiency for applicant from non-English speaking countries

## TIMELINES



\*Timeline is subject to change.



## How to Apply

- ☞ To access the on-line application, find the “Apply Now” banner on the KINGS website(www.kings.ac.kr), under the “Admission” menu.
- ☞ Create your own account and fill in all the required information for each page of them.
- ☞ The on-line application page will be available only during the official application period. Please refer to the notice on KINGS website for the 2024 application period.

## Required Documents <sup>1)</sup>

- |   |  |        |
|---|--|--------|
| 1 | Application for admission  | Form 1 |
| 2 | Statement of purpose   | Form 2 |
| 3 | Study & career plan  | Form 3 |
| 4 | Certificate of employment  | Form 4 |
| 5 | Two letters of Recommendation  | Form 5 |
| 6 | Original diploma and transcripts of undergraduate degree <sup>2)</sup> |        |
| 7 | Proof of proficiency in English  |        |
| 8 | Verification and Consent to the integrity of the documents             |        |

<sup>1)</sup> All forms(1~5, 8) are provided at the application system (www.kings.ac.kr).  
Identification photo taken within 3 months (black and white, snapshot photo will not be accepted).

<sup>2)</sup> For academic credentials, an overseas degree should be approved either by apostille or consular confirmation by local Korean Embassy it may be replaced as a PDF document of the original as you consent to verify yourself at the application system.



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## Proof of English Proficiency

☞ An applicant whose native language is not English **MUST** demonstrate his/her English language proficiency by submitting any certificates from authorized institutions.

※ Exemption from submission of English Test Report

1. Applicants from U.S.A, Canada, U.K, Australia, New Zealand, Ireland(Native English Speaker).
2. Applicants from a country that uses English as a official language.
3. Applicants who have completed their entire university courses in English  
(It is required to submit certificates verifying that courses are fully taught in English.)

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## Important Notice

☞ For the applicants who pass the documents review are required to take **Personal Inventory Test** through on-line. Internet access link will be sent individually.

☞ All application documents must be typed(not hand-written) in English.

☞ Non-English documents are not accepted, but it is possible when attach a notarized English translation.

☞ **All** submitted documents will **NOT** be returned.

☞ If an applicant has gained admission in an illegal manner(through forgery, alteration of documents, of document translation errors) then the **admission will be nullified**. Furthermore, if a criminal case is suspected, the candidate/student will be reported to the authorities of Republic of Korea and of the applicant's home country in compliance with the law.

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## Application Fee

☞ KINGS does not charge an application fee for international students.

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## Mailing Address

☞ Room #510 main building

658-91 Haemaji-ro, Seosaeng-myeon, Ulju-gun, Ulsan 45014 Republic of Korea

admission@kings.ac.kr

# EDUCATION PROGRAM

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## Department of Nuclear Power Plant Engineering



## Introduction

The Department of NPP (Nuclear Power Plant Engineering) offers a comprehensive graduate-level program that encompasses all aspects of a nuclear power plant project, starting from the design and certification phase, and continuing through the operation, management, and ultimately the decommissioning phase. Our program provides students with both theoretical and practical training, equipping them with the necessary skills to lead nuclear power plant projects in their respective countries.

The majority of our students are employed professionals with prior work experience in nuclear power-related corporations or companies, either in the Republic of Korea or other countries. Upon completion of the two-year (four-semester) program at KINGS, students are awarded a Master's Degree in Nuclear Power Plant Engineering. They have the option to pursue either a Master of Engineering (ME) or a Master of Science (MS) degree.

During their first year, students undertake various courses that cover different areas of NPP Engineering, such as design, project management, construction, safety analysis, radiation protection, decommissioning, and waste management. In their second year, students specialize in a specific study area through a team project or conducting research that integrate engineering and management aspects of an NPP project. This prepares our students for global leadership positions within the energy organizations of their respective countries.

## Graduation Requirements

### ▶ Degree Type

- Master of Engineering (ME) in Nuclear Power Plant Engineering
- Master of Science (MS) in Nuclear Power Plant Engineering

### ▶ Common Requirements

- Minimum of 36 credits, Minimum GPA of B- (2.7/4.3)
- Study Period: 2 years (March 2025 - February 2027) at KINGS
- Thesis (MS) or Project Report (ME) approved by the Examining Committee

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Note: Departmental requirement(s) per degree type may apply.

# EDUCATION PROGRAM

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## Department of Energy Policy & Engineering





## Introduction

Energy policy is a complex process in which economics, environmental protection, and sustainability issues are interconnected. The Department of Energy Policy and Engineering offers a curriculum that aims to develop the capability to understand and solve problems arising from this complex process in an integrated manner.

The program is designed to cultivate global-level energy policy decision makers and executives who possess a comprehensive understanding of both theory and practice. This is achieved through lectures, practical training, and the sharing of experience with fellow students from various fields, including electric power companies and overseas public institutions.

The department operates a two-year program: the first year focuses on energy policy and engineering courses at KINGS, while the second year is dedicated to thesis research or individual project report conducted at the student's affiliated institution. Upon completion, students have the opportunity to earn a Master of Engineering (ME) or Master of Science (MS) degree from KINGS.

## Graduation Requirements

### ▶ Degree Type

- Master of Engineering (ME) in Energy Policy and Engineering
- Master of Science (MS) in Energy Policy and Engineering

### ▶ Common Requirements

- Minimum of 36 credits, Minimum GPA of B- (2.7/4.3)
- Study Period: First year at KINGS / Second year at student's affiliated organization
- Thesis (MS) or Project Report (ME) approved by the Examining Committee

Note: Departmental requirement(s) per degree type may apply.



# FINANCIAL DETAILS

## Tuition & Fees<sup>1)</sup>

### Tuition

Tuition is 48.4 million KRW per academic year. Tuition covers lectures, lecture materials, access to the library, and access to other facilities relevant to academic activities.

### Matriculation Fee

The matriculation fee is 1 million KRW.

### Living Cost

The total rate of room and board is 12.8 million KRW per year including three meals a day.

<sup>1)</sup> All fees and costs are based on the 2024 academic year and are subject to change for the 2025 academic year.





## Financial Aid & Service

### Scholarship

The **KINGS Global Scholarship** covers a maximum of two years of full-time study. All new eligible international students are awarded the global scholarship. **To maintain the KINGS global scholarship, recipients must have satisfied the requirements (minimum GPA of B-, 2.7/4.3) as outlined in KINGS regulations.** The scholarship covers the above-mentioned tuition, matriculation fee, and room & board fee.

**International Atomic Energy Agency (IAEA)** supports the participation of fellow in KINGS Master's Degree Program in **Nuclear power plant engineering** based on IAEA's policy. Please contact the IAEA liaison office in your country.

**RCA** provides sponsorship for the KINGS Master's Degree Program in **Energy Policy and Engineering** based on RCA policy. Please visit the website (<http://www.rcaro.org/>) and contact the RCA Regional Office for detailed information.

– RCA : Regional Cooperative Agreement for research, development and training related to nuclear science and technology for Asia and the Pacific.

※ It is subject to change by funding sources and scholarship demand.

### Assistantship

**Administrative Assistantships (AA)** are available for eligible international students.

The monthly assistantship stipend rate depends on the actual hours of service provided by the student each month. Students can work up to a maximum 20 hours per month and will be paid 300,000 KRW.

### Medical & Insurance

The Korean government requires a mandatory health insurance. Any foreigner who has stayed for more than six months must subscribe to the Public National Health Insurance since 1 March 2021. The amount of health insurance fee is approximately 75,000 KRW per month.

KINGS provides basic health check-ups and care at the health office. For international students who need medical treatment at a hospital, KINGS health office refers the hospital information to the students.



# CAMPUS LIFE

## Facilities

- 🎓 KINGS dormitory has 200 single occupancy rooms, a cafeteria, and an Islamic prayer room.
- 🎓 Each dormitory room is equipped with a bathroom, a study desk, a single bed, and a refrigerator.
- 🎓 KINGS cafeteria provides regular Korean and Western meals.
- 🎓 A fully furnished common kitchen is also available for student use.
- 🎓 Residential facilities including tennis and basketball courts, a futsal field, a ping-pong room, and a gym are available.
- 🎓 KINGS has high-speed internet connection which students can access on campus, free of cost.
- 🎓 A Kookmin Bank(KB) ATM is also available on campus.

## Monthly Events for KINGS Students

February 2025	March	April
Orientation	Matriculation 1 <sup>st</sup> Semester Open	Spring Event
May	June	July
Student council election	1 <sup>st</sup> Culture Trip	Summer Session
August	September	October
Summer Vacation	2 <sup>nd</sup> Semester Open	Fall Event
November	December	January 2026
Photo Shoot	Winter Vacation	Commencement

※ The schedule is subject to change.

For more information, visit the KINGS website([www.kings.ac.kr](http://www.kings.ac.kr)) or contact Academic Affairs Team at [admission@kings.ac.kr](mailto:admission@kings.ac.kr)



# Course Description

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## Department of Nuclear Power Plant Engineering



## Curriculum & Study Areas

### Common Compulsory Courses for All Tracks

- **CN103** Nuclear Power Plant Engineering
- **CN201** Advanced Power Reactor and Small Modular Reactor
- **EL101, EL201** Leadership and Communication, **TW101, TW112, TW201** Technical Writing for Research, **SD101** Speech and Debate, **CCP101, CCP202** Cross Cultural Program

### NPP Design and Nuclear Safety Track

• The NPP Design and Nuclear Safety Track offers a comprehensive curriculum focused on nuclear reactor design, simulation, and safety assessment. Students will explore core design methodologies, safety aspects, and neutron behavior analysis using advanced nuclear design codes. They will develop proficiency in numerical methods for reactor physics, including Monte Carlo simulations, and gain insights into probabilistic risk assessment for managing uncertainties in nuclear plant operations. Practical experience includes thermal hydraulics analysis using industry-standard codes and learning safety philosophies and methods through case studies of major nuclear accidents. This track prepares students for roles in nuclear engineering with a strong emphasis on safety, design optimization, and risk management.

#### ▶ Study Areas

Reactor Physics, Reactor Core Design and Simulation, Probabilistic Risk Assessment and Management, Thermal Hydraulics and Safety Analysis

#### ▶ Elective Courses

- **EN114** Nuclear Reactor Design Theory for APRI400
- **EN228** APRI400 Nuclear Reactor Simulation using Nuclear Design Codes
- **EN115** Numerical Methods for Reactor Physics
- **EN227** Application of Neutron Transport Theory
- **EN116** Basic Probabilistic Risk Assessment
- **EN230** Intermediate Probabilistic Risk Assessment
- **EN107** Simulation of Thermal Hydraulic Systems
- **EN226** Safety Analysis



## Curriculum & Study Areas

### NPP Decommissioning and Spent Fuel Management Track

The NPP Decommissioning and Spent Fuel Management Track offers a specialized curriculum covering essential aspects of nuclear decommissioning and spent fuel management. Students will study radioactive waste management, including waste classification, treatment methods, and disposal techniques, along with the decontamination and decommissioning processes of nuclear facilities. The curriculum delves into the entire nuclear fuel cycle, addressing both initial processes such as fuel handling and concluding processes like spent fuel management options such as reprocessing and long-term storage. Students will gain practical skills in radiation shielding analysis using Monte Carlo simulations, focusing on radiation protection for nuclear facilities. Additionally, the track includes training in environmental impact assessment, covering radiological risk assessment, environmental analysis, and emergency planning and response for nuclear incidents. This comprehensive program prepares students for roles in managing nuclear waste, decommissioning nuclear facilities, and ensuring environmental safety and regulatory compliance in the nuclear sector.

#### ▶ Study Areas

NPP Decommissioning, Spent Fuel & Waste Management, Radiation Safety & Environmental Protection

#### ▶ Elective Courses

- **ER101** Radioactive Waste Management
- **ER202** Nuclear Fuel Cycle
- **EN117** Radiation Shielding Analysis
- **EN229** Environmental Impact Assessment
- **EN239** Nuclear Fuel & Materials





## NPP Engineering and Project Management Track (INMA–NTM Program)

The NPP Project Management and Construction Track offers a specialized curriculum designed to equip students with comprehensive knowledge and practical skills in managing international nuclear power plant (NPP) projects. This track covers essential aspects of project development, construction management, financial analysis, environmental impact assessment, and regulatory compliance within the nuclear sector. The Project Management and Construction Track Program of the Department of NPP was granted membership within the INMA-NTM (International Nuclear Management Academy Master's Programmes in Nuclear Technology Management) program on 27 September 2023 by the IAEA. Consequently, students in the Project Management and Construction Track who elect to enroll in the nine specified compulsory courses designated for the INMA-NTM program will be granted both a KINGS master's degree certificate and a Certification of Recognition for the INMA endorsed Programme upon their graduation.

### ▶ Study Areas

New NPP Construction, Project Management, Civil & Earthquake Engineering

### ▶ Elective Courses

- **EP105** NPP Project Development and Contract
- **EP207** NPP Construction Project Management
- **EP104** NPP Project Deployment
- **EN231** NPP Site Hazard Analysis and Evaluation
- **EF102** NPP Financial Management
- **EN118** Energy Business Environment
- **EL202** Licensing Process and Codes and Standards Application in Overseas NPPs

### ▶ INMA Compulsory Courses

- **CN103** Nuclear Power Plant Engineering
- **CN201** Advanced Power Reactor and Small Modular Reactor
- **EP104** NPP Project Deployment
- **EP207** NPP Construction Project Management
- **EN118** Energy Business Environment
- **EL101** Leadership and Communication I
- **EL201** Leadership and Communication II
- **SS101** Safety Culture and Communication
- **SD101** Speech and Debate

※ Common Compulsory Courses for All Tracks, Elective Courses, and INMA Compulsory Courses are based on the curriculum for the 2024 academic year, thus they are subject to change.

## Course Description



### Common Compulsory Courses

#### **CN103 Nuclear Power Plant Engineering**

This course covers 20 topics as per the IAEA's International Nuclear Management Academy standards, including national energy policy, safety regulations and licensing, nuclear security and safety protocols, project contracts and management, financial management, safety culture, and strategic leadership. It features special lectures by industrial experts as well as field trips to nuclear power plants. Students will also experience a simulated power plant using VR technology.

#### **CN201 Advanced Power Reactor and Small Modular Reactor**

Students learn about the safety design, licensing requirements, and components of the Advanced Pressurized Reactor (APR1400) and receive hands-on training using PC-based simulators. The course also covers small modular reactor (SMR) design, focusing on cutting-edge technology and passive safety systems.

#### **EL101, EL201 Leadership and Communication**

Based on Harvard's Leadership and Negotiation Program, this course series trains current and future leaders of energy or nuclear/radiological organizations to become adept at internal and external communication. It involves understanding oneself and others, learning the "principled negotiation" model, and engaging in interactive class activities and reflection assignments. The advanced fall semester course further develops these skills through complex cases and individualized coaching, requiring active participation and reflection assignments to build on the foundational skills from the initial course.

#### **SS101 Safety Culture and Communication**

Students will be able to understand the definition, necessity and attributes of safety culture at nuclear power plants together with the relationship between safety culture and leadership, between safety culture and communications. This course will establish students' leadership development plan through utilizing the principles and strategies of fostering safety culture and communications.

#### **SD101 Speech and Debate**

This course enhances students' public speaking, group discussion, oral presentation, written communication, and critical thinking skills through the use of debating techniques to analyze social, political, and economic issues. Students engage in discussions and formal debates on key issues affecting businesses and the global community. After learning the basics of argumentation, refutation, case construction, and presentation techniques, students produce a video recording of their own presentation as a term project.

#### **TW101, TW112, TW201 Technical Writing**

Students develop essential academic writing skills, focusing on crafting research papers and mastering techniques for writing a master's thesis. Through drafting, feedback, and revisions, they learn the structure of a research paper, clear and logical development, and English sentence patterns and phrases. Advanced courses build on these skills, with weekly assignments and detailed feedback, preparing students to effectively write their thesis and other professional documents in the energy field.

#### **CCP101, CCP202 Cross Cultural Program**

This program consists of three sub-programs: Culture Korean (CK), Cross Culture (CC), and Culture Trip (CT). CK aids international students in developing basic spoken and written Korean, focusing on communicative language skills. CC fosters stronger cultural understanding and respect for cultural diversities by enhancing communication skills and promoting cultural exchanges between Korean and international students. Additionally, CT is offered at the end of each semester to encourage social and cultural interactions among students.



## Elective Courses

### **EN114 Nuclear Reactor Design Theory for APRI400**

This course introduces the theories and methodologies of nuclear core design and analysis. It covers basic concepts of nuclear physics, diffusion theory, reactor kinetics, core design method and reactor analysis procedure including safety aspects. This course emphasizes PWR reactor core design and corresponding reactor engineering problems.

### **EN228 APRI400 Nuclear Reactor Simulation using Nuclear Design Codes**

This course introduces nuclear design computer codes like CASMO and MASTER for analyzing neutron behavior and nuclear fuel assemblies. It covers methodologies such as homogenization and energy group condensation, including hands-on projects to optimize fuel rod diameters and loading patterns.

### **EN115 Numerical Methods for Reactor Physics**

This course equips students with essential skills for implementing numerical methods in reactor core analysis, covering integration, differentiation, linear algebra, and matrix eigenvalue problems. Students also learn to solve fundamental neutron diffusion equations numerically and gain basic Python programming skills. By applying these methods and programming techniques, students will develop a simple one- or two-dimensional neutronics code to grasp the overall process of neutronics calculations.

### **EN227 Application of Neutron Transport Theory**

This course focuses on neutron transport theory, a key component of nuclear engineering for understanding neutron behavior in reactor cores. Students will derive and explore the neutron transport equation and its physical meanings, and learn both deterministic and probabilistic methods to solve it. The course includes practical applications using the Method Of Characteristic and Monte Carlo methods, with hands-on experience in Python programming.

### **EN116 Basic Probabilistic Risk Assessment**

This course covers Probabilistic Safety Assessment (PSA) and reliability analysis, which integrate and evaluate all aspects of a nuclear power plant's safety and reliability. It focuses on understanding how uncertainty impacts plant behavior and assessment outcomes. Essential to the course is a strong grasp of probabilistic concepts and methods to perform accurate analyses.

### **EN230 Intermediate Probabilistic Risk Assessment**

This course addresses the growing need for engineers skilled in risk and reliability analysis within the nuclear industry. It is essential for those involved in Probabilistic Risk Assessment (PRA) and serves as a foundation for further PRA-related courses. The course covers the technical aspects of PRA for risk assessment, includes practical exercises, and discusses the development of PRA to address key issues in nuclear power engineering, comparing deterministic and probabilistic approaches.

### **EN107 Simulation of Thermal Hydraulic Systems**

This course introduces the basics of nuclear thermal hydraulics (NTH), focusing on nuclear system codes and their application in safety analysis. Students will use RELAP/MARS codes to simulate thermal hydraulic systems and evaluate how system configurations and parameters affect responses. A hands-on approach includes developing a comprehensive model of a nuclear power plant experiencing a design basis accident scenario for the term project.

## Course Description

### **EN226 Safety Analysis**

This course aims to deepen students' understanding of nuclear safety philosophy, requirements, and fundamental concepts, crucial for thermal design and safety analysis. It covers both deterministic safety analysis, including uncertainties, conservatism, and thermal hydraulic transients, and probabilistic safety analysis. Students will explore key thermal-hydraulic phenomena through Chapter 15 of the FSAR document, learn about system codes, and examine severe accident phenomena and lessons from major nuclear accidents.

### **ER101 Radioactive Waste Management**

Covering the entire scope of radioactive waste management, this course includes waste generation, classification, treatment, and disposal, as well as decontamination and decommissioning of nuclear installations. It introduces principles, objectives, and technologies related to radioactive waste management.

### **ER202 Nuclear Fuel Cycle**

The course covers both the front end and back end of the nuclear fuel cycle, including spent fuel management options like reprocessing, recycling, storage, and disposal. It aims to develop understanding and insight into the economic, social, and policy issues of spent fuel management.

### **EN117 Radiation Shielding Analysis**

This course provides foundational knowledge on radiation, including its exposure, health effects, and concepts of radiological protection, as well as radiation shielding analysis for nuclear facilities. Students will engage in practical demonstrations using the Monte Carlo radiation transport simulation code, specifically the Particle and Heavy Ion Transport code System (PHITS).

### **EN229 Environmental Impact Assessment**

This course covers radiological risk assessment and environmental analysis, including source-term, atmospheric dispersion, exposure pathways, and dose assessment during normal operations, design basis accidents, and severe accidents. It also addresses radiological and nuclear emergency planning and response (EPR). Students will understand safety fundamentals and practice radiological environmental impact assessment (R-EIA) using a PC simulator of the APRI400 and the RASCAL emergency response code developed by the US NRC.

### **EN239 Nuclear Fuel & Materials**

This course focuses on the properties and in-core performance of major reactor materials, such as nuclear fuel, using principles from thermodynamics and materials engineering. Students will learn about the thermal and mechanical behavior changes of reactor materials and the effects of neutron irradiation. Practical sessions with nuclear fuel performance analysis codes will highlight the key factors influencing the thermal and mechanical performance of nuclear fuel.

### **EP105 NPP Project Development and Contract**

This course covers the planning, development, evaluation, funding, and contracting of international nuclear power plant (NPP) projects, as well as other international mega-projects. It examines various delivery methods such as DBB, EPC turnkey, DBF, and BOO, and addresses factors like financing, resources, and project risk. Students will learn about preparing bids and proposals while considering marketing, construction, operation, and financial risks. The course is particularly useful for those interested in exporting or importing nuclear power plants, offering valuable insights into managing NPP project risks through contract approaches.

### **EP207 NPP Construction Project Management**

Focusing on schedule, cost, and quality control in international construction projects, this course covers NPP projects and other mega projects. It includes practical skills through case studies and software practices, emphasizing successful project management from both owner and contractor perspectives.

### **EP104 NPP Project Deployment**

This course addresses concerns and activities for implementing a national civil nuclear energy program, following the IAEA milestones approach. It covers diverse concepts related to pre-project activities and project development, with a focus on milestones 1 and 2.

### **EN231 NPP Site Hazard Analysis and Evaluation**

Students learn modern analysis techniques for evaluating natural hazards like meteorological, flood, and earthquake risks in nuclear power plant site selection. The course includes statistical techniques and special review processes for site evaluation and safety analysis.

### **EF102 NPP Financial Management**

This course provides an overview of nuclear finance, covering capital budgeting, risk and return, LCOE estimation, and project valuation. It includes practical Excel techniques for financial analysis, recommended for engineers to enhance their career prospects.

### **EN118 Energy Business Environment**

The course covers aspects of the energy business environment, including market, political, legal, regulatory, and societal factors. It uses energy planning tools for country-specific energy plans and addresses environmental effects on project delays and cost overruns.

### **EL202 Licensing Process and Codes and Standards Application in Overseas NPPs**

This course covers the licensing process and the application of codes and standards critical for nuclear power plant safety and efficiency. It ensures compliance with safety regulations and provides a framework for design, construction, testing, and operation.

### **ED103 Introduction to Data Analysis and Machine Learning**

An introduction to Python programming and statistics, this course covers measurement principles, probability distributions, correlation, and regression. It includes an overview of artificial intelligence and machine learning applications.

### **EA204 Advanced Data Analysis and Application**

Focusing on data analysis techniques used in artificial intelligence, this course emphasizes regression and forecasting. Students apply these techniques to datasets to understand data behavior and make predictions.

### **EN217, EN221 NPP O&M Management and Leadership**

This course spans two semesters and covers the engineering management of nuclear power plants to maintain and improve their safety and economic effectiveness. The first semester focuses on fundamental operation management topics such as safety policy implementation, organization, human resources, operating systems, and management models, with applicability to nuclear plants in various countries. The second semester delves into nuclear power plant commissioning, operation, maintenance, and engineering, incorporating insights from major industry organizations and reviewing significant nuclear plant accidents from a management perspective.

### **EN119 NPT, Nuclear Disarmament & Non-Proliferation**

This course prepares future leaders in nuclear energy by providing comprehensive knowledge of international nuclear norms, focusing on the three pillars of the NPT: non-proliferation, disarmament, and peaceful uses of nuclear energy. It includes a detailed, article-by-article analysis of the NPT, highlighting the dual-use nature of nuclear technologies and comparing WMD categories. Emphasizing nuclear non-proliferation, students also study safeguards, export control, nuclear disarmament, and the role of nuclear energy in addressing the climate crisis.

### **EN238 NPT, Verification & Peaceful Nuclear Uses**

This course builds on first semester learnings from "NPT, Nuclear Disarmament & Non-Proliferation" to delve into nuclear non-proliferation through safeguards, verification, and international agreements. It emphasizes nuclear energy's role in climate action, aligning with the UN SDGs, and explores the influence of emerging technologies on peaceful nuclear applications.

# Course Description

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## Department of Energy Policy and Engineering



## Curriculum & Study Areas

### Energy Policy and Engineering Track

The Energy Policy and Engineering Track offers a comprehensive curriculum designed to provide students with an in-depth understanding of the technical, economic, and policy dimensions of the energy sector. This program integrates foundational knowledge with advanced analytical skills, preparing students for various roles in energy management, policy-making, and technical operations.

#### ▶ Study Areas

Net-Zero Microgrid and Small Modular Reactor, Financial Management, Environment Policy and Utility Management, Net-Zero Technology and Project Development, Project Valuation and Risk Management, Grid Planning and Power System Development

#### ▶ Compulsory Courses

- **CE102** Electric Resource Planning and Optimization
- **CE103** Electric Power System Economics
- **CE201** Electricity Market Design and Operation
- **EP208** Grid Planning and Power System Development
- **CP201** Project Valuation and Risk Analysis
- **EL101, EL201** Leadership and Communication, **TW101, TW112, TW201** Technical Writing for Research, **SD101** Speech and Debate, **CCP101, CCP202** Cross Cultural Program

#### ▶ Elective Courses

- **EE108** Net-Zero Technology and Grid Transformation
- **EM212** Net-Zero Microgrid and Small Modular Reactor
- **EC103** Corporate Finance and Accounting
- **EE106** Environment Policy and Utility Management
- **ED103** Introduction to Data Analysis and Machine Learning
- **EA204** Advanced Data Analysis and Application

※ Compulsory Courses and Elective Courses are based on the curriculum for the 2024 academic year, thus they are subject to change.



## Course Description



### Common Compulsory Courses

#### **CE102** Electric Resource Planning and Optimization

This course explores how to optimally combine and operate diverse energy resources by considering various sustainability variables important to power companies. It frames this challenge as an optimization problem involving several policy variables. Students will quantitatively analyze optimal resource plans using professional tools and practical system data to derive the best alternatives.

#### **CE103** Electric Power System Economics

This course examines the investment and operation of power systems in the context of competitive electricity markets. It covers fundamental microeconomic concepts, market organization, operational reliability, ancillary services, network congestion, and investments in transmission and generation. The instructor, drawing on extensive field experience, provides practical insights into these issues. Students will learn to develop innovative solutions to power system problems, tailored to varying conditions across different countries, markets, and companies.

#### **CE201** Electricity Market Design and Operation

This course examines the dynamic evolution of electricity markets, focusing on the roles of policymakers, regulators, and stakeholders. It covers regulatory schemes, market design, operational processes, and risk management, with an emphasis on hands-on experimental market design. The instructor will share practical insights from extensive field experience. Students will gain a comprehensive understanding of the complexities of market design and operation, as well as investment and risk management in competitive electricity markets.

#### **EP208** Grid Planning and Power System Development

This course delves into the technical and economic aspects of power systems, covering essential topics like load flow calculation, fault current calculation, and stability techniques crucial for power system design and operation. Real-world cases related to transmission network development will be emphasized. Students will gain a deep understanding of power system planning and operational theory, equipping them for effective power system management.

#### **CP201** Project Valuation and Risk Analysis

This course equips students with financial tools essential for making sound energy investment decisions, emphasizing the connection between corporate finance knowledge and project valuation and risk analysis. It focuses on how energy investors apply financial models to enhance project value and achieve financial flexibility for their core investment strategies.

#### **EL101, EL201** Leadership and Communication

Based on Harvard's Leadership and Negotiation Program, this course series trains current and future leaders of energy or nuclear/radiological organizations to become adept at internal and external communication. It involves understanding oneself and others, learning the "principled negotiation" model, and engaging in interactive class activities and reflection assignments. The advanced fall semester course further develops these skills through complex cases and individualized coaching, requiring active participation and reflection assignments to build on the foundational skills from the initial course.

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### **TW101, TW112, TW201** Technical Writing

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## Elective Courses

### **EE108** Net-Zero Technology and Grid Transformation

This course examines various net-zero technologies, including renewables, energy usage, and SMRs, and their integration into power grids. Through lectures and insights from industry experts, students will explore the technical requirements for these technologies from the perspectives of grid operators and renewable energy developers. The course provides both practical insights and a framework for evaluating energy technology systems and evolving power grids in engineering and economic contexts.

### **EM212** Net-Zero Microgrid and Small Modular Reactor

This course covers the components and operation of microgrids, which include small power supplies, batteries, and monitoring/control equipment, highlighting the role of SMR technology. Microgrids usually operate with the utility power system but can function independently during accidents, ensuring high reliability. The course focuses on the optimal combination and economic operation of power facilities and energy storage devices. Students will understand microgrid components and engage in discussions on optimal design and operation using the HOMER software-based simulator.

### **EC103** Corporate Finance and Accounting

This course provides a comprehensive overview of energy finance, integrating general finance theories with practical decision-making tools and Excel techniques for financial analysis. Key topics include capital budgeting under uncertainty, risk and return, capital structure, and power project valuation. The second part of the course focuses on regression analysis essential for data forecasting.

### **EE106** Environment Policy and Utility Management

This course provides a comprehensive overview of energy systems, markets, and the impact of climate change, highlighting the interconnection between energy, economy, and environment. It covers national energy and environmental policies, energy market demand and supply, and key issues in the energy transition. Topics include the economics of fossil fuel and renewable energy supply, energy demand analysis, and pollution control. The course is essential for understanding the evolving landscape of energy policy and its challenges.

### **ED103** Introduction to Data Analysis and Machine Learning

An introduction to Python programming and statistics, this course covers measurement principles, probability distributions, correlation, and regression. It includes an overview of artificial intelligence and machine learning applications

### **EA204** Advanced Data Analysis and Application

Focusing on data analysis techniques used in artificial intelligence, this course emphasizes regression and forecasting. Students apply these techniques to datasets to understand data behavior and make predictions.

# Growing together!

# KINGS





2025 ADMISSION GUIDELINES

