RUST OPERATIONAL ACADEMIC PROGRAMMES FRAMEWORK JAN 2020

Good education in this fourth industrial revolution should be a weapon to alleviate poverty worldwide. Education is the only diamond gift every person should give to the colleague, brothers, sisters, friends and nationals.

Rutherford University of Science and Technology is a private and nonprofit education entity with social responsibility is to bring innovated education to all worldwide. Rutherford University of Science and Technology(RUST) is a human values-education centered higher learning institution. It has started by arts, scientists and engineering professionals in 2012 and now operating in countries worldwide. The University now has HQ in Kigali, Rwanda and other regional offices in Africa and beyond. The University has a serious operating philosophy which makes its graduates found brilliant at labor market worldwide. The University has a strong operational ethical behavior which transforms its graduates into competent candidates while recruited by public or private institutions. The University has a strategic plan to have its own physical facilities in all the centers worldwide since then until 2030.

For the time the world's economy is growing faster, we need to think the best strategies and methodologies to bring education closer to all and make it more inclusive. It is under this context that Rutherford University of Science and Technology (RUST) thought to bring closer education with quality programs implementation plan so as enabling people from lower income countries to come up with reputable knowledge and skills which enable them discovering development trends and opportunities in their home areas by capacitating them to develop their critical thinking bound by right and positive attitudes to transform their socio-economic side starting from themselves.

Abraham Lincoln, the 16th US President said: "The best way to predict the future is to create it" and Nelson Mandela says, "**Education is the most powerful weapon which you can use to change the world.**" **Education** is the key to eliminating gender inequality, to reducing poverty, to creating a sustainable planet, to preventing needless deaths and illness, and to fostering peace. Students take pride to study in Rutherford University of Science and Technology as it is a university coaching, mentor and incubate its students to think big for solving worldwide challenges as starting from their home livelihoods. RUST is a great, modern university, in a great global learning environment and has a driving ambition to discover and disseminate knowledge, to make higher education accessible and beneficial to all those with the passion and ability to succeed. Founded in 2012, and since then, the University has been an e-learning platform hosting its exams physically invigilated for all professionals; especially in Africa, America, Latin America, Canada, Asia and Oceania with financial assistance and that is dedicated to implementing higher quality education

respecting international academic standards and makes education accessible to all professionals worldwide. Our students' regional education standards are not disrupted but improved. The University brings its philosophy to harmonized regionally accredited programs with the University academic programs for continuous academic quality improvement.

Vision

RUST a leading institution of higher learning, recognized globally for excellence in science, technology, and innovation, fostering sustainable development in Africa and beyond.

Rutherford University of Science and Technology has to make sure that people worldwide especially those coming from remote areas and financially left behind have access to quality education via innovated ways of skills transfer via digital learning aided tools while connecting them to fourth industrial revolution. This is accomplished under virtual learning technics supervised by RUST coaching and examination centers worldwide.

Values and Ethics

The values of Rutherford University of Science and Technology are "***Integrity, Accountability, Ownership, Professionalism and Excellence***".

Motto

The motto of Rutherford University of Science and Technology is "***Education Innovated***".

Mission

Rutherford University of Science and Technology is a federal university of Africa whose mission is: Training clergy and leaders to guide well the flock of God and their communities; to educate, to innovate, to conduct research & creativity and to spread innovated education outreach worldwide especially for defining better socio-economic transformation. Practically, provide high-quality, research-led education in science and technology, producing graduates who are critical thinkers, innovators, and ethical leaders, capable of addressing complex societal challenges. Micro-credentials or biometric-biodata development and management from the start of the program to the end makes the university exceptional in the sustainable social economic transformation and development journey.

Objectives

Rutherford University of Science and Technology has the following objectives:

- Providing a solid scientific, intellectual and professionally innovated education;
- Promoting research to meet community needs;

- Providing services to society;

- Creating a competent human resources brilliant with moral and civic values;

- Organizing conferences and seminars to reinforce its research world-wide;

Philosophy

The philosophy of Rutherford University of Science and Technology is based on six fundamental principles:

- To have excellent leadership character bound by right attitudes;

- To work for growth & learning from mistakes;

- To have positive thoughts and being unique;

- To live RUST values.

- To create visionary and resourceful mind

- To be team worker with excellent social responsibility feelings

Academic Induction

Academic induction is the process of introducing new academic staff or students to the academic institution of Rutherford University of Science and Technology, its culture, and their specific roles. It aims to ease the transition into a new academic environment by providing essential information, support, and opportunities for connection with colleagues and peers.

For new academic staff, induction typically includes:

Introduction to the institution:

Information about the university's structure, policies, procedures, and resources.

Role-specific training:

Guidance on teaching practices, assessment methods, and relevant academic standards.

Orientation to the department and team:

Meeting colleagues, learning about local procedures, and understanding expectations.

Access to support and resources:

Information on mentorship programs, IT support, library services, and other relevant resources.

For new students, induction often involves:

Welcome and introductions:

A warm welcome from the institution and introductions to key staff and fellow students.

Course information:

Details about the curriculum, learning outcomes, assessment methods, and academic expectations.

Campus orientation:

Familiarization with the physical environment, including key buildings, facilities, and support services.

Introduction to library and IT resources:

Guidance on accessing online resources, research tools, and support for academic work.

Social events and networking opportunities:

Opportunities to connect with other students and build a sense of community.

The benefits of a well-structured induction program include:

Increased staff and student retention:

Feeling welcomed, supported, and informed can lead to greater job satisfaction and a smoother transition into the academic community.

Improved academic performance:

Access to resources and support, combined with a clear understanding of expectations, can enhance student success.

Enhanced sense of belonging:

Induction programs help new members feel connected to the institution and its community.

Efficient onboarding:

A structured induction process ensures that new staff and students are equipped with the necessary knowledge and skills to succeed from the outset.

RUST also conducts a profession induction

Profession induction is the process of integrating new employees (Students and/or Staff) into their roles and the organization, often through formal and informal onboarding activities. It's a crucial step in ensuring new hires feel welcomed, understand their responsibilities, and become productive members of the team.

Key aspects of profession induction:

Familiarization:

Induction helps new employees learn about the company culture, mission, values, and organizational structure.

Role Clarity:

It clarifies job expectations, performance goals, key performance indicators (KPIs), and reporting lines.

Team Integration:

Induction facilitates introductions to colleagues, managers, and key stakeholders, fostering a sense of belonging.

Practical Information:

New hires receive essential information on policies, procedures, and resources they need to perform their job effectively.

Positive First Impression:

A well-structured induction can significantly impact job satisfaction, engagement, and retention.

Benefits of induction:

Increased Productivity: Employees who receive proper induction are more likely to be productive sooner.

Improved Engagement: Induction can boost employee morale and engagement from the start.

Reduced Turnover: Effective induction can minimize early attrition and associated costs.

Enhanced Employer Branding: A positive induction experience can enhance the organization's reputation as an employer.

Phases of Induction:

Pre-Induction: Activities before the employee's first day, such as paperwork and initial communication.

Induction: The formal and informal onboarding process during the initial days and weeks.

Post-Induction: Ongoing support and adjustment to the new role after the initial period.

Examples of Induction Activities:

Formal Presentations: Introducing the company, its departments, and key personnel.

Mentorship Programs: Pairing new hires with experienced employees for guidance and support.

Team Building Activities: Fostering connections and collaboration among team members.

Training Sessions: Providing job-specific skills and knowledge.

Welcome Events: Creating a welcoming atmosphere for new employees.

How to Apply

All applications should be made online when applications open 1st January 2020. For the prospective candidates, RUST administration respects their home country higher learning rules and regulations regarding the student admission criteria during the application. The candidate should provide all the supporting documents to assess the current academic level and match it with the programme he/she selects. This will enable RUST graduates to find equivalences to their degrees where it is made mandatory.

Existing Programs:

The list of available programs are in general indicated in various schools in the website here but with others depending upon the applicant regional location (especially for African, Latin American, Asian and Oceania professionals who are competent and present for the financial assistance need) and whose list is as following:

Programs: Science, Technology, Engineering, Environmental Studies; Arts and Humanities/Social Sciences; Medicine and Health Sciences; Agriculture and Veterinary Medicine; Education, Law; Business and Economics; Psychology

For any candidate who want to apply should click here to download the application form

EXISTING REGIONALLY HARMONIZED AND ACCREDITED PROGRAMS

COLLEGES	SCHOOLS	DEPARTMENTS	PROGRAM LEVEL
The College of Science, Technology and Environment Studies (FSTES)	School of Environmental Studies and Management	Environmental Management	Bachelor
		Environmental Studies	Bachelor
		Wildlife Studies	Master PhD
		Wildlife Management	Master PhD
		Ecosystem Management	Master PhD
		Environmental Policy and Law	Master PhD
		Resource Management	Master PhD
		Climate Change and Pollution Control	Master PhD
		Ecology and Biodiversity	Master PhD
	School of Home Economics & Human Nutrition	Agriculture Economics	Bachelor Master PhD
		Agricultural and Rural Innovation	Master PhD
		Precision Agriculture	Master PhD

		Agricultural and applied Economics	Bachelor Master
		Human Nutrition	Bachelor Master
		Food studies	Bachelor Master PhD
		Entrepreneurship Studies	Bachelor Master PhD
		Animal Production	Bachelor Master PhD
	School of Information & Communication Technology	Information Technology	Bachelor Master PhD
		Mass Communication	Bachelor Master
		Networking and multimedia	Bachelor Master
		Communication Engineering	Bachelor Master PhD
		Computer Engineering	Bachelor Master PhD
	School of Sciences and Technologies	Applied Statistics.	Bachelor Master PhD
		Production Technology	Bachelor Master PhD
		GIS & Remote Sensing	Bachelor Master PhD
		Water and Sanitation Technology	Bachelor Master PhD
		Air conditioning and Refrigeration Technology	Bachelor Master PhD

		Biomedical and laboratories sciences	Bachelor Master PhD
		Biochemistry	Bachelor Master PhD
		Electromechanical Technology	Bachelor Master PhD
		Computer Sciences	Bachelor Master PhD
		Thermo-physics and nanocompositions	Bachelor Master PhD
		Textile and clothing technology	Bachelor Master
		Mathematics	Bachelor Master PhD
		Medical laboratory technologies	Bachelor Master PhD
	School of Agriculture and Natural resource	Agriculture & Rural Development	Bachelor Master PhD
		Mining and Geology	Bachelor Master PhD
College of Engineering	School of Civil and Environment Engineering	Land surveying and architecture	Bachelor Master PhD
		Civil and Building Engineering	Bachelor Master PhD
		Transportation Engineering	Bachelor Master PhD
		Geotechnical Engineering	Bachelor Master PhD
		Structural Engineering	Bachelor Master

			PhD
		Environmental Engineering and management	Bachelor Master PhD
		Bridges and highway engineering	Bachelor Master PhD
		Mining engineering	Bachelor Master PhD
		Aerospace Engineering	Bachelor Master PhD
		Land surveying and architecture	Bachelor Master PhD
		Geo-spatial Information Systems	Bachelor Master PhD
		Architectural Design and Technology	Bachelor Master PhD
	school of electrical and electronic engineering	Electrical engineering	Bachelor Master PhD
		Mechatronic Engineering	Bachelor Master PhD
		Electrical and Computer engineering	Master PhD
		Electronic and Telecommunication engineering	Bachelor Master PhD
	School of mechanical and production engineering	Mechanical and Manufacturing Engineering	Bachelor Master PhD
		Automotive and Power Engineering	Bachelor Master PhD
		Transportation Engineering	Bachelor Master PhD

		Chemical engineering	Bachelor Master PhD
		Power Conversion & Energy Systems Engineering	Bachelor Master PhD
		Industrial Engineering and Management	Bachelor Master PhD
		Chemical Engineering	Bachelor Master PhD
		Production Engineering	Bachelor Master
	school of biomedical engineering	Biomedical Engineering	Bachelor Master PhD
College of Education(CED) ;	School of Education	Educational administration and Management	Bachelor Master PhD
		Precision Education	Master PhD
		Psychotherapy with Education	Bachelor Master PhD
		Education and Pedagogy Management: -Technical Educational Pedagogy Management -General Educational Pedagogy Management	Bachelor Master PhD
		Education with Sciences (Mathematics, Physics, Chemistry, Biology, Computer Science, etc…)	Bachelor Master PhD
		Education With Arts (Economics, Entrepreneurship, Accounting, Geography, English, French, Kiswahili, etc…)	Bachelor Master PhD
		Early Childhood Care and Development	Bachelor Master PhD
		Special Need Education	Bachelor

			Master PhD
		Psychology	Bachelor Master PhD
College of Law(CLAW);	School of Law	Business Law	Bachelor Master PhD
		Legal Management	Bachelor Master PhD
		Constitutional and International Law	Master PhD
		Criminal Law	Master PhD
		Law Enforcement	
		Economic Law	Master PhD
		Law	Bachelor Master PhD
\College of Arts and Social Sciences(CASS)	School of Film Production	Film Production Technology	Bachelor Master PhD
	School of Journalism and Media Studies	Journalism	Bachelor Master PhD
		Multimedia	Bachelor Master PhD
	School of Linguistics and Literary Studies	Linguistics and Literary Studies	Bachelor Master PhD
	School of Political Science and Public Administration	Public Administration and Management	Bachelor Master PhD
		International Relations	Bachelor Master PhD
		Conflict Resolution with Mediation	Bachelor Master PhD
		International Cooperation and	Master

		Development	PhD
		Public Office Management	Bachelor Master PhD
		Political Science and Administration	Bachelor Master PhD
	School of Sociology and Social work	Social Work and Social Administration	Bachelor Master PhD
		Social Work and Theology	Bachelor Master PhD
		Sociology	Bachelor Master PhD
	School of Tourism and Hospitality Management	Tourism and Hospitality Management	Bachelor Master PhD
		Hospitality Management	Bachelor Master PhD
		Tourism and Travels Management	Master PhD
		Eco-tourism Management	Master PhD
	Economics and Community Economic Development (CECED)	Community based Development	Bachelor Master PhD
		Economics and Management	Bachelor Master PhD
		Community Safety and Security Management	Master PhD
		Economics and Metric Computing	Bachelor Master PhD
	Geography	Geography	Bachelor Master PhD
	History	History	Bachelor Master

			PhD
College of Medicine and Health Sciences(CMHS);	School of Nursing	General Nursing	Bachelor Master PhD
		Midwifery	Bachelor Master PhD
		Dentistry and Periodontics	Bachelor Master PhD
	School of Health Sciences	Environmental Health Sciences	Bachelor Master PhD
		Healthcare Management	Bachelor Master PhD
		Community Healthcare and Development Studies	Bachelor Master PhD
		Public Health & Management	Bachelor Master PhD
		Medical Laboratory Sciences	Bachelor Master PhD
		Pharmaceutical Sciences.	Bachelor Master PhD
	School of Medicine (Research Based)	Microbiology and Parasitology	Master PhD
		Mental Heath	Master PhD
		Precision Mental Health	Master PhD
		Immunology	Master PhD
		Surgery and Anesthesiology (Brain, Heart)	Master PhD
		Medical Intelligence	Master PhD
		Oncology	Master PhD

		Radiology and Imaging	Master PhD
		Precision Medicine	Master PhD
		Reproductive Health	Master PhD
College of Business (CB)	School of Business Administration	Marketing and Entrepreneurship	Bachelor Master PhD
		Accounting and Financial Precision	Bachelor Master PhD
		Banking and Finance	Bachelor Master PhD
		Financial Accounting	Bachelor Master PhD
		Business Administration and Management	Bachelor Master PhD
		Leadership and Governance	Bachelor Master PhD
		Valuation and Property Management	Bachelor Master PhD
		Project Management	Bachelor Master PhD
		Accounting and Finance	Bachelor Master PhD
		Banking, Insurance and Finance	Bachelor Master PhD

Annex-I.

Admission Criteria

A student to be admitted should show the following:

1. Filling the application form found to the link https://www.rustedu.org/news/details/24, sign it and submit it to the provided email on the form and this shows a student responsibility to comply with the university regulations.
2. Submitting the academic documents received from accredited academic institution; for graduates' the bachelor degree should have been received from the accredited University. For secondary school leaving students (Level 6 certificate holders); the certificate should have been provided by right academic authorities. The student should clearly show the address of the academic institution which holds his/her previous academic details.
3. The student should submit an application email indicating the course/program
4. Later found the student submitted forged documents, RUST should cancel all the services rendered to the involved student and this case shall be filed to courts.
5. Application is always open as we operate into open learning scheme. Students can do course-works that others did to stay tuned. A Student is not allowed to do at the same time more than 3 course-works of differed modules.

Mode of study

1. Studies are done by Course works for Diploma, Bachelor, Masters and PhD
2. At the end of the program, students in Diploma do a project, Students in Bachelor level do a research project.
3. For Master's applicants note that Masters and PhD Combined program also exist only for research students and is highly academically competitive
4. The programs with internships and industrial exposure:
    - **Engineering courses:** A student will pay additional 200 Euros as internship (IAP) supervisory fee at the RUST school regional account where the practices will be conducted. This will be facilitated by RUST Center administration. (100 Euros for industrial attachment program and 100 Euros laboratory practices)
    - **None Engineering Courses:** A student will pay additional 50 Euros as internships supervisory fee at the RUST school regional account where the practices will be conducted. This will be facilitated by RUST Center administration.

For Sciences that require Laboratory exposure: A student will pay additional 150 Euros as internship (IAP) supervisory fee at the RUST school regional account where the practices will be conducted. This will be facilitated by RUST Center administration. (100 Euros for industrial attachment program and 50 Euros laboratory practices);

The thesis/research project supervisory fee is paid by any student under RUST academic scheme: For the time Master's thesis fee is 200 Euros and Bachelor research project fee is 150 Euros;

Only students who paid the said amount will be eligible to do the internship, research projects and thesis and which will be accomplished in their home countries under supervision of University lecturers in their corresponding centers as supervisors and RUST academic partner as Co-supervising institutions.

Master's program is accomplished only by course works and thesis (this is for study based)

For Research based Masters there is a set of modules to be completed by course works and then publish papers between 3 to 5 depending upon the program type

For PhD program, the program is accomplished by research only. The published papers should vary between 6 to 10 and depending upon the program type.

For both Masters and PhD students, their papers should be published in a journal with high impact and this is made mandatory.

The Publication fee should be catered by a student.

A passing coursework should have a minimum of 75%

The student allowed to do a Thesis, research project is the one with the overall cumulative results (Course works results + Exams results) grade of 3.0 per 4 grade scale (GPA). This means a "B".

No student is allowed to do Thesis/research project unless the provision "4" is accomplished.

Before starting working on dissertation, research project, research paper a student should submit at least 3 topics proposal to the school academic senate with their abstracts for approval purpose and then receive a green light to do the following works.

A candidate with the grade below a "B" of 75% should be delayed to research publication, thesis, and research project and will pay additional 20 Euros for each failed course to retake.

A student failing the retake course should be discontinued for a period not less than 6 months and not more than a year depending upon the program and school academic senate decision. To resume the course; a student should pay a registration fee of 40 Euros per course (Including course registration fee and course study fee)

A student has a freedom of speech to his/her courses. Information for best practice is free and easy to find when needed. A student who continues to fail should contact the coaching center administration for career guidance purposes.

Based on the career guidance decision a student can change the program and apply for new admission in the other program following the admission requirement indicated to the new program he/she chooses. This is done while academic office realize a serious student fail of retakes.

Studies are fully accomplished under course-works and live invigilated exams in accordance with American Higher Learning Standards while studying under the student regional accredited academic perspective

Worldwide Applicants Credit Transfer

For a student transferring his/her credits from one University to RUST; just pay a total of 20 Euros and referred as credits transfer fee and deposited to the University Account provided by the nearest university academic center.

Notarized copies of transcripts, copy of ID/Passport are submitted to e-mail: admission@rustedu.org

The student need to complete the application form downloadable from https://www.rustedu.org/news/details/24 and submit it with the said transcript copies to the above mentioned email.

RUST reserves the rights to contact the Academics DVC of the students host University for authenticating the provided credentials. Dear candidate, please provide clearly the address including region, area, telephone and emails of your current education.

Fee structure

As the aim of the University is to open education accessibility to all while delivering knowledge, skills and attitude so that at the end of the course a student will be able to transform his/her socio-economic sector toward sustainable development; the students with presidential scholarship levels (80%) will pay; only tuition fee, dissertation supervision fee:

Bachelor degree program fee of (three years): 720 Euros equivalent to the remaining 20%

Master's degree program fee of ((Coursework + Thesis) or (Coursework + Research) Upon completion: 2 years max): 1200 Euros equivalent to the remaining 20%

PhD Program fee of (Upon Completion: 3 years max): 1800 Euros equivalent to the remaining 20%

For African Diploma holders and who have already graduated will only pay a one year corresponding fee: this means 240 Euros to complete a bachelor degree program with the above mentioned internship fee 200 Euros, Research Project fee of 150 Euros which make the total of 590 Euros. For none Engineering courses its 240 Euros to complete a bachelor degree program+ Internship fee of 50 Euros + Research Project fee of 150 Euros which make it the total of 440 Euros for the remaining courses to bridge to Bachelor degree. Medicine and health sciences related programs are treated as engineering courses. The provision "10." is only valid for studied modules with RUST.

For publication; the publication fee will be catered by a research candidate

Students are allowed to pay in installments. No student is allowed to do an exam without having paid the self-committed instalment of the month through which the exam is scheduled. Exams are invigilated face to face in RUST nearer examination and coaching centers.

Students out of University Presidential Scholarship scheme should pay 100%

Graduation Pre-requisites

A student should pass at least with the minimum of 75% of course work scheme

A RUST student should make sure that the graduation prerequisite is a “B” or 3 under the 4.0 grade scale (GPA) in earned credits.

Students should cooperate with regional course tutors for academic course clarification support. Tutors are course facilitators so, the student should be concentrated enough to pass.

Papers should be published before graduation. This applies only for research/thesis oriented students.

A student should defend the final research project either physically or by video conference and evaluated by regional program facilitators (minimum pass mark is 75%).

Admission Criteria

The following shall are the admission criteria for year one bachelor’s program applicants:

General requirements

The applicant should have be able to use one of the languages: English, French as main medium of learning instructions

Having a school diploma or equivalent

Being eligible by higher education standards

Showing the academic results statement copy delivered by right accredited institutions

Specific requirement:

Engineering and Medicine or Equivalent Programs Applicants

Holding a school science/technic diploma or equivalent

Working in the requested program related field is an added value

For sciences school diploma/equivalent holders are requested to submit videos doing practices for hands-on laboratory need courses upon the course work implementation schedules. This is a graduation prerequisite. RUST Centers worldwide should investigate if a student is doing so and report it. The university will only provide a demo to support a student to implement the practice. The practice laboratory and cost is chosen, negotiated and catered by a student. The university advises to do practices in nearby public or private technical schools (Polytechnics).

Prepared by Distance Learning Office/RUST

Online Education.

Graduation Fee structure

Gown fee

Diploma and Bachelor graduates: 30 Euros

Masters graduates: 30 Euros

PhD graduates: 50 Euros

ACADEMIC CALENDAR

Academic Year 2020

The admission application is always open for RUST. We have two semesters; The Spring and Fall.

The academic year is organized in sub-semesters as following:

Sub-semester One: Monday: 6th January 2020 to Friday 28th March 2020

Sub-semester two: Monday: 05th April 2020 to Friday 31st July 2020

Sub-semester three: Monday 10 August to Friday 16 October 2020

Sub-semester four: Monday 25 October to Thursday 31st December 2019

At the end of each sub-semester there is a week for consolidation works

The graduation date is always: each 4th November and 31st May of each year

Fee clearance deadline for graduates is 30 October and 27th May each year

Approved by RUST Board of trustees

Online Education

DEPARTMENTAL DETAILS AND UPDATED IN ACCORDENCE WITH THE DEMAND

I. CORE DISCIPLINES FOR BIOMEDICAL ENGINEERING

Biomechanics: Focuses on the mechanics of living systems, including musculoskeletal mechanics and human movement.

Biomaterials: Studies the properties and applications of materials used in medical devices and implants.

Medical Imaging: Explores techniques like MRI, CT scans, and ultrasound for diagnosis and treatment.

Biomedical Instrumentation: Covers the design, development, and application of medical devices and equipment.

Bioinformatics: Involves the application of computational tools to analyze biological data.

II. CORE DISCIPLINES FOR PUBLIC HEALTH

1. Epidemiology:

The study of disease patterns and how they spread within populations. This includes understanding disease outbreaks, risk factors, and prevention strategies.

2. Biostatistics:

The application of statistical methods to public health problems, including study design, data analysis, and interpretation.

3. Health Policy and Management:

Focuses on the development, implementation, and evaluation of health policies and programs.

4. Health Promotion:

Covers strategies for encouraging healthy behaviors and lifestyles, including disease prevention and health education.

5. Community Health:

Addresses the health needs of specific communities, often involving community-based research and programs.

6. Environmental Health:

Examines the impact of environmental factors on human health, such as air and water quality.

7. Health Economics:

Applies economic principles to healthcare, analyzing costs, benefits, and resource allocation.

8. Global Health:

Focuses on health issues that transcend national borders, including infectious disease outbreaks and health disparities.

III. POWER SYSTEMS ENGINEERING CORE DISCIPLINES

1. Power System Analysis:

Steady-state and transient analysis:

Analyzing power flow in delivery networks under normal and fault conditions.

Load flow studies:

Determining voltage and current magnitudes in power systems to ensure stable operation.

Short circuit analysis:

Evaluating fault currents to design protective devices.

Power system dynamics and stability:

Studying the behavior of power systems under disturbances and maintaining stability.

2. Power System Protection and Control:

Relaying and circuit breakers: Designing and implementing protective systems to isolate faults and prevent equipment damage.

SCADA (Supervisory Control and Data Acquisition): Utilizing control systems to monitor and manage power systems remotely.

Smart grid technologies: Integrating advanced control and communication technologies for enhanced system performance.

3. Power System Economics:

Cost analysis of generation, transmission, and distribution:

Evaluating the economic viability of different power system configurations.

Market operations and pricing:

Understanding the economic aspects of power trading and pricing mechanisms.

Renewable energy integration:

Assessing the economic impact of integrating renewable energy sources into the power grid.

4. Renewable Energy Integration:

Solar, wind, and other renewable energy sources:

Analyzing the impact of integrating these sources on power system stability and reliability.

Energy storage solutions:

Evaluating the role of energy storage in managing the intermittency of renewable energy sources.

Microgrids and distributed generation:

Designing and implementing localized power systems for increased resilience and efficiency.

5. **High-voltage engineering:**

Working with high-voltage equipment and systems for power transmission.

6. **Power electronics:**

Designing and applying power electronic devices for efficient power conversion and control.

7. **Electrical machines:**

Understanding the principles of operation and control of electrical machines used in power generation and conversion.

8. **Electric drives:**

Studying the application of electric motors and drives in various industrial and transportation systems.

These core disciplines are crucial for the reliable, efficient, and sustainable operation of modern power systems.

MECHATRONICS ENGINEERING CORE DISCIPLINES

1. **Mechanical Engineering:**

Provides the foundation for understanding the physical components, mechanisms, and dynamics of systems.

2. **Electrical Engineering:**

Deals with the design and implementation of electronic circuits, sensors, and actuators within the mechatronic system.

3. **Computer Engineering:**

Focuses on the software and hardware aspects of control systems, including embedded systems, programming, and digital logic.

4. **Control Engineering:**

Emphasizes the design and analysis of control algorithms and strategies to achieve desired system behavior and performance.

CHEMICAL ENGINEERING CORE DISCIPLINES

Chemical engineering is an engineering discipline that uses **chemistry, physics, biology, and mathematics** to design and develop processes for transforming raw materials into useful products on a large scale. It focuses on the production, transformation, and transportation of chemicals, energy, and materials, optimizing industrial processes and ensuring safety and environmental responsibility.

Key aspects of Chemical Engineering:

Core Principles:

Chemical engineers apply principles of chemistry, physics, biology, and mathematics to solve problems related to chemical, biological, and energy systems.

1. **Process Design and Optimization:**

They design and optimize industrial processes for manufacturing various products, including chemicals, pharmaceuticals, fuels, and food.

2. **Product Development:**

Chemical engineers are involved in the development of new products, including advanced materials, pharmaceuticals, and sustainable energy solutions.

3. **Scale-Up:**

They bridge the gap between laboratory research and large-scale industrial production, ensuring that processes are efficient, safe, and environmentally friendly.

4. **Interdisciplinary Nature:**

Chemical engineering integrates knowledge from various engineering and scientific disciplines, including materials science, computer science, and biomedical engineering.

5. **Diverse Applications:**

Chemical engineers work in a wide range of industries, including pharmaceuticals, biotechnology, energy, environmental engineering, and advanced materials.

In essence, chemical engineering is a field that utilizes scientific and mathematical principles to create and optimize processes for producing valuable products and addressing critical global challenges related to energy, materials, and the environment.

Core aspects of chemical engineering:

Process Design and Development:

Chemical engineers design and optimize processes for manufacturing chemicals, fuels, foods, pharmaceuticals, and other products.

Material Science:

They develop new materials with specific properties, such as nanomaterials for electronics or biomaterials for medical applications.

Reaction Engineering:

They study and optimize chemical reactions to improve efficiency and yield in industrial processes.

Separation Processes:

Chemical engineers develop methods to separate and purify chemicals, such as distillation, filtration, and extraction.

Process Control:

They design and implement control systems to ensure safe and efficient operation of chemical processes.

Sustainability:

Chemical engineers play a vital role in developing sustainable processes and minimizing environmental impact.

Examples of applications:

Pharmaceuticals: Developing new drugs and drug delivery systems.

Food Industry: Optimizing food processing and packaging.

Energy: Developing new energy technologies, such as fuel cells and renewable energy systems.

Environmental Engineering: Designing wastewater treatment plants and pollution control systems.

Key skills for chemical engineers:

Strong foundation in chemistry, physics, and mathematics.

Problem-solving and analytical skills.

Ability to work in teams and communicate effectively.

Knowledge of process simulation and design software.