Column1	Column2	Column3	Column4	Column5

1. Circulum design format offline.

-Name : tshingombe Tshitadi

-4.1 .1

course title| course objectives| |

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course title	course objectives	course description	activity to carry out	ID source of
Advanced Electromagnetic Theory	Advanced Electromagnetic Theory: This delves into Maxwell's equations, electromagnetic waves, and their applications in various fields such as antenna design, microwave engineering, and more.	Course Descriptions	Advanced Electromagnetic Theory	Sources for Advanced Electrical Engineering Courses
Digital Signal Processing				
Control Systems Design	Digital Signal Processing (DSP): This involves the analysis and manipulation of signals. It's crucial in areas such as communications, audio and speech processing, radar, and image processing.	Advanced Electromagnetic Theory: This course delves into the intricacies of Maxwell's equations and their applications. Topics include electromagnetic wave propagation, radiation, and scattering. Students will learn to design and analyze antennas, microwave circuits, and other electromagnetic devices.	Objectives:	1.
Advanced Communication Systems				Advanced Electromagnetic Theory
Power Systems Engineering	Control Systems Design: This focuses on designing systems that can control the behavior of other systems. Applications include robotics, aerospace, automotive systems, and industrial automation.	Digital Signal Processing (DSP): This course focuses on the principles and applications of discrete-time signal processing. Topics covered include sampling, digital filter design, Fourier transforms, and signal analysis. Students will gain hands-on experience with MATLAB/Python for implementing DSP algorithms.	•	

Renewable Energy Systems			Understand Maxwell's equations and their applications.	2.
VLSI (Very Large Scale Integration) Design	**Advanced Communication Systems**: This covers the principles and technologies behind modern communication systems, including wireless communications, fiber optics, and satellite communications.	**Control Systems Design**: This course covers the design and analysis of feedback control systems. Students will learn about root locus, frequency response, and state-space methods for controller design. Applications include robotics, aerospace, and automotive systems.		1.
Machine Learning in Electrical Engineering			•	**Books**: "Classical Electrodynamics" by John David Jackson, "Principles of Electrodynamics" by Melvin Schwartz
	Power Systems Engineering: This involves the generation, transmission, and distribution of electrical power. It covers topics such as power system stability, smart grids, and renewable energy integration.	**Advanced Communication Systems**: This course explores the principles of modern communication systems. Topics include modulation and demodulation, noise analysis, and the design of wireless and optical communication systems. Students will also study the latest advancements in communication technologies.	•	
			Analyze electromagnetic wave propagation in different media.	2.
	Renewable Energy Systems: This explores the technologies and systems used to generate energy from renewable sources like solar, wind, and hydroelectric power. It's increasingly important for sustainable development.	**Power Systems Engineering**: This course covers the generation, transmission, and distribution of electrical power. Topics include power system stability, protection, and smart grids. Students will also learn about the integration of renewable energy sources into power grids.		3.
			•	**Online Courses**: MIT OpenCourseWare, Coursera

	VLSI (Very Large Scale Integration) Design: This involves designing and creating integrated circuits with millions of transistors on a single chip. It's essential for the development of modern electronic devices.	**Renewable Energy Systems**: This course examines the technologies and systems used to generate energy from renewable sources such as solar, wind, and hydroelectric power. Topics include energy conversion, efficiency analysis, and the design of renewable energy systems.	•		
			Design and analyze antennas and microwave circuits.		4.
	Machine Learning in Electrical Engineering: This examines the application of machine learning techniques to solve problems in electrical engineering, such as predictive maintenance, signal processing, and system optimization	**VLSI (Very Large Scale Integration) Design**: This course focuses on the principles of designing integrated circuits with millions of transistors. Topics include digital and analog circuit design, fabrication processes, and the use of VLSI design tools. Students will gain practical experience in designing and simulating VLSI circuits.			3.
			•		Digital Signal Processing (DSP)
	Advanced Electromagnetic Theory: This delves into Maxwell's equations, electromagnetic waves, and their applications in various fields such as antenna design, microwave engineering, and more.	**Machine Learning in Electrical Engineering**: This course introduces the application of machine learning techniques to solve electrical engineering problems. Topics include supervised and unsupervised learning, neural networks, and deep learning. Students will apply machine learning to areas such as predictive maintenance, signal processing, and system optimization.	**Activities:**		
					4.
	Digital Signal Processing (DSP): This involves the analysis and manipulation of signals. It's crucial in areas such as communications, audio and speech processing, radar, and image processing.	These descriptions should give a comprehensive overview of each course. If you need more detailed information on any specific topic or have any other questions, feel free to ask!	•		1.

		Solve problems involving Maxwell's equations.	**Books**: "Digital Signal Processing" by Alan V. Oppenheim and Ronald W. Schafer
	Control Systems Design: This focuses on designing systems that can control the behavior of other systems. Applications include robotics, aerospace, automotive systems, and industrial automation.		
		•	2.
	Advanced Communication Systems: This covers the principles and technologies behind modern communication systems, including wireless communications, fiber optics, and satellite communications.	•	3.
		Conduct experiments on wave propagation and antenna design.	**Online Courses**: edX, Coursera, MIT OpenCourseWare
	Power Systems Engineering: This involves the generation, transmission, and distribution of electrical power. It covers topics such as power system stability, smart grids, and renewable energy integration.		
		•	4.
	Renewable Energy Systems: This explores the technologies and systems used to generate energy from renewable sources like solar, wind, and hydroelectric power. It's increasingly important for sustainable development.	•	5.
		Use simulation software to model electromagnetic fields.	Control Systems Design

	VLSI (Very Large Scale Integration) Design: This involves designing and creating integrated circuits with millions of transistors on a single chip. It's essential for the development of modern electronic devices.		
		•	6.
	Machine Learning in Electrical Engineering: This examines the application of machine learning techniques to solve problems in electrical engineering, such as predictive maintenance, signal processing, and system optimization	Digital Signal Processing (DSP)	1.
			Books: "Modern Control Engineering" by Katsuhiko Ogata, "Feedback Control of Dynamic Systems" by Gene F. Franklin, J. Da Powell, and Abbas Emami-Naeini
		Objectives:	
		•	2.
		•	3.
		Understand discrete-time signals and systems.	Online Courses: Udemy, Coursera, Khan Academy
		•	4.
		•	7.
		Apply Fourier transform techniques to signal analysis.	Advanced Communication Systems
		•	8.
		•	1.
		Design and implement digital filters.	Books: "Digital Communications" by John G. Proakis, "Wireless Communications" by Andrea Goldsmith

	•	2.
	Activities:	3.
		Online Courses: edX, Coursera, MIT OpenCourseWare
	•	
	Implement digital filter algorithms in MATLAB or Python.	4.
		9.
	•	Power Systems Engineering
	•	
	Analyze real-world signals using DSP techniques.	10.
		1.
	•	Books: "Power System Analysis and Design" by J. Duncan Glover, Mulukutla S. Sarma, and Thomas Overbye
	•	
	Conduct experiments with audio and image processing.	2.
		3.
	•	Online Courses: edX, Coursera, MIT OpenCourseWare
	Control Systems Design	
		4.
	Objectives:	11.

		Renewable Energy Systems
	•	
	Understand the principles of feedback and control systems.	12.
		1.
	•	**Books**: "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle, "Renewable Energy Systems: The Earthscan Expert Guide to Renewable Energy Technologies for Home and Business" by Dilwyn Jenkins
	•	
	Design controllers using root locus, frequency response, and state-space methods.	2.
		3.
	•	**Online Courses**: edX, Coursera, FutureLearn
	•	
	Analyze the stability and performance of control systems.	4.
		13.
	•	VLSI (Very Large Scale Integration) Design
	Activities:	

		14.
	•	1.
	Design and simulate control systems using MATLAB/Simulink.	**Books**: "CMOS VLSI Design: A Circuits and Systems Perspective" by Neil Weste and David Harris
	•	2.
	•	3.
	Perform hands-on experiments with control system hardware.	**Online Courses**: edX, Coursera
	•	4.
	•	15.
	Solve real-world control problems, such as robotics or automotive systems.	Machine Learning in Electrical Engineering
	•	16.
	Advanced Communication Systems	1.

		Books: "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy, "Pattern Recognition and Machine Learning" by Christopher M. Bishop
	Objectives:	
		2.
	•	3.
	Understand modulation and demodulation techniques.	**Online Courses**: edX, Coursera, Stanford Online
	•	4.
	•	
	Analyze the performance of communication systems in the presence of noise.	
	•	
	•	
	Design wireless communication systems and networks.	
	•	
	Activities:	
	•	
	Simulate communication system components in MATLAB or Python.	

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•
Analyze the performance of different modulation schemes.
•
•
Design and implement a small-scale wireless communication system.
•
Power Systems Engineering
Objectives:
•
Understand the generation, transmission, and distribution of electrical power.
•
•
Analyze power system stability and reliability.
•
•
Integrate renewable energy sources into power grids.
•
Activities:
•
Conduct load flow and fault analysis using power system software.

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Design and analyze power system protection schemes.

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Simulate the integration of renewable energy sources into the grid.

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Renewable Energy Systems

Objectives:

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Understand the principles of solar, wind, and other renewable energy technologies.

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Analyze the efficiency and performance of renewable energy systems.

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Design and implement renewable energy solutions.

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Activities:

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Conduct experiments with solar panels and wind turbines.

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	Simulate renewable energy systems using software tools.
	•
	•
	Design a small-scale renewable energy project.
	•
	VLSI (Very Large Scale Integration) Design
	Objectives:
	•
	Understand the principles of VLSI design and fabrication.
	•
	•
	Design digital and analog integrated circuits.
	•
	•
	Use VLSI design tools and methodologies.
	•
	Activities:
	•
	Design and simulate VLSI circuits using software like Cadence or Synopsys.
	•
	•
	Fabricate and test simple VLSI circuits in a lab.
	•
	•

Analyze the performance and power consumption of VLSI circuits.
•
Machine Learning in Electrical Engineering
Objectives:
•
Understand machine learning algorithms and their applications.
•
•
Apply machine learning techniques to electrical engineering problems.
•
•
Analyze the performance of machine learning models.
•
Activities:
•
Implement machine learning algorithms in Python or MATLAB.
•
•
Apply machine learning to problems such as predictive maintenance or signal processing.
•
•
Evaluate the performance of machine learning models on real-world data.

- These objectives and activities provide a solid foundation for each course. If you need more specific details or help with any of these topics, feel free to ask!

Orientation Courses:

Orientation courses set the foundation for a successful doctoral journey. They often include:

- **Research Methodologies**: Training on how to design and conduct research effectively.
- **Academic Writing**: Guidance on writing dissertations, theses, and academic papers.
- **Ethics**: Understanding the ethical considerations and responsibilities in research.
- **Departmental Policies**: Insights into the university's and department's policies and resources.

These orientation courses help students acclimate to the academic environment and ensure they are well-prepared to embark on their research journey.

AIU's Specific Offerings:

AIU seems to offer a robust program with courses like:

- Electromagnetic Theory
- Digital Systems Design
- Renewable Energy Technologies
- Robotics and Automation
- Advanced Control Systems

Seminars and Professional Development:

- **Seminars**: Regular seminars on current research topics and emerging trends.

Interdisciplinary Courses: Opportunities to collaborate across various fields.
•
•
Professional Development: Courses and workshops focused on developing skills for research and leadership roles.
•
Comprehensive Exams and Dissertation:
•
Comprehensive Exams: Tests covering a wide range of topics in electrical engineering to ensure thorough understanding.
•
•
Dissertation Project: A significant piece of original research that contributes to the field.
•
Career Preparation:
Master
Course Topics Description and Resource Bibliography
Orientation Courses
Research Methodologies

-

Description : Training on designing and conducting research effectively, including qualitative and quantitative methods.

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Resources :

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    Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* . SAGE Publications.

  -

    Yin, R. K. (2017). *Case Study Research and Applications: Design and Methods* . SAGE Publications.

  -

Academic Writing

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Description : Guidance on writing dissertations, theses, and academic papers, focusing on structure, clarity, and academic integrity.

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Resources :

-
    - Swales, J. M., & Feak, C. B. (2012). *Academic Writing for Graduate Students: Essential Tasks and Skills* . University of Michigan Press.
    -
    -
    - Murray, R. (2011). *How to Write a Thesis* . Open University Press.
    -

Ethics

-

Description : Understanding the ethical considerations and responsibilities in research, including plagiarism, data integrity, and human subjects' protection.

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Resources :

-
    - Resnik, D. B. (2015). *The Ethics of Research with Human Subjects* . Springer.
    -

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Shamoo, A. E., & Resnik, D. B. (2009). *Responsible Conduct of Research* . Oxford University Press.

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Departmental Policies

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Description : Insights into the university's and department's policies and resources, including academic regulations, support services, and administrative procedures.

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Resources :

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University-specific guidelines and handbooks.

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AIU Academic Policies and Procedures Manual.

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AIU's Specific Offerings

Electromagnetic Theory

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Description : Study of electromagnetic fields, Maxwell's equations, wave propagation, and applications in engineering.

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Resources :

-
    - Jackson, J. D. (1998). *Classical Electrodynamics* . Wiley.
    -
    - Griffiths, D. J. (2017). *Introduction to Electrodynamics* . Cambridge University Press.
    -

Digital Systems Design

-

Description : Design and analysis of digital systems, including logic circuits, microprocessors, and digital communication systems.

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Resources :

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    -

Mano, M. M., & Ciletti, M. D. (2014). *Digital Design* . Pearson.

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  -

Wakerly, J. F. (2018). *Digital Design: Principles and Practices* . Pearson.

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Renewable Energy Technologies

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Description : Study of technologies for generating energy from renewable sources such as solar, wind, and hydroelectric power.

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Resources :

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  -

Boyle, G. (2004). *Renewable Energy: Power for a Sustainable Future* . Oxford University Press.

-
  -

Masters, G. M. (2013). *Renewable and Efficient Electric Power Systems* . Wiley-IEEE Press.

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- Robotics and Automation
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-
  - *Description* : Design and implementation of robotic systems and automated processes for various applications.
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-
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  -
  - *Resources* :
-
  -
    - Siciliano, B., & Khatib, O. (2008). *Springer Handbook of Robotics* . Springer.
    -
    -
    - Craig, J. J. (2004). *Introduction to Robotics: Mechanics and Control* . Pearson.
-
    -
- Advanced Control Systems
-
-
  - *Description* : Analysis and design of complex control systems using various methods and techniques.
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-
  -
  -
  - *Resources* :
-
  -
    -

Ogata, K. (2010). *Modern Control Engineering* . Prentice Hall.

-
-

Franklin, G. F., Powell, J. D., & Emami-Naeini, A. (2015). *Feedback Control of Dynamic Systems* . Pearson.

-

Master in Modern Power and Energy Systems

School of Science and Engineering

Academic Freedom to Discover Your Purpose

Open Curriculum Design at Atlantic International University

The master’s program offered at Atlantic International University provides students an opportunity to gain expert knowledge in power and energy systems. The demand for renewable energy sources and the urgency to protect our environment is rapidly growing, and our program prepares engineers to approach these issues. We provide students with the management and technical tools necessary to understand and effectively plan and deliver sustainable, energy-efficient systems.

Opportunity to gain expert knowledge in power and energy systems. The demand for
Our program prepares engineers to approach these issues. We provide students with the management and technical tools necessary to understand and effectively plan and deliver.
Core Courses and Topics in Modern Power and Energy Systems
Economic Decision Making
Fundamentals of Energy System Integration
Mathematical Methods of Mechanical Engineers 1
Wind Energy Systems
A.I. in Energy Systems
Solar Thermal Engineering
Engineering Project Management
Random Signals and Noise
Circuits and Systems II
Signals and Systems
Energy Conversion
Electromagnetic Fields I
Electronic Circuits I
Linear Systems
Power System Steady-State Analysis
Transients in Power Systems
Power Electronics
Renewable Energy Systems
Orientation Courses
Communication & Investigation (Comprehensive Resume)
Organization Theory (Portfolio)
Experiential Learning (Autobiography)

Academic Evaluation (Questionnaire)
Fundament of Knowledge (Integration Chart)
Fundamental Principles I (Philosophy of Education)
Professional Evaluation (Self Evaluation Matrix)
Development of Graduate Study (Guarantee of an Academic Degree)
Research Project in Modern Power and Energy Systems
Masters Thesis Project
MBM300 Thesis Proposal
MBM302 Master Thesis (7,500 words)
Publication: Each Master of Education graduate is encouraged to publish their research papers either online in the public domain or through professional journals and periodicals worldwide.
Employment Opportunities in Modern Power and Energy System
Power Systems Engineer
Power System Analyst
Director of Energy Systems
Lead Engineer
Power System Modeling Engineer
Senior Manager
Get to know the AIU experience
Contact Us Today!

The Master of Renewable Energy (MS) program helps students develop practical skills and knowledge required to critically evaluate alternative energy sources, and provide applied solutions to the energy demand. The major is decidedly interdisciplinary in nature, focusing on the underlying natural processes relating to renewable energy and employing the scientific method. The Master of Renewable Energy (BS) program is offered online via distance learning. After evaluating both academic record and life experience, AIU staff working in conjunction with Faculty and Academic Advisors will assist students in setting up a custom-made program, designed on an individual basis. This flexibility to meet student needs is seldom found in other distance learning programs. Our online program does not require all students to take the same subjects/courses, use the same books, or learning materials.
Important: Below is an example of the topics or areas you may develop and work on during your studies. By no means is it a complete or required list as AIU programs do not follow a standardized curriculum. It is meant solely as a reference point and example. Want to learn more about the curriculum design at AIU? (Course and Curriculum)
Core Courses and Topics in Renewable Energy:
Introduction to Renewable Energy
Solar Thermal Energy
Solar Photovoltaics

Global Change
Bioenergy
Geothermal Energy
Hydroelectricity
Tidal Power
Natural Resource Management
Wind Energy
Wave Energy
Orientation Courses:
Communication & Investigation (Comprehensive Resume)
Organization Theory (Portfolio)
Experiential Learning (Autobiography)
Academic Evaluation (Questionnaire)
Fundament of Knowledge (Integration Chart)
Fundamental Principles I (Philosophy of Education)
Professional Evaluation (Self Evaluation Matrix)
Development of Graduate Study (Guarantee of an Academic Degree)

Column6	Column7	Column8

bibliography

Advanced Electromagnetic Theory

1.

Jackson, J. D. (1998). *Classical Electrodynamics* . Wiley.

2.
3.
Griffiths, D. J. (2017). *Introduction to Electrodynamics* . Cambridge University Press.
4.
5.
Balanis, C. A. (2012). *Advanced Engineering Electromagnetics* . Wiley.

6.
Digital Signal Processing
1.
Oppenheim, A. V., & Schafer, R. W. (2009). *Discrete-Time Signal Processing* . Prentice Hall.

2.
3.
Proakis, J. G., & Manolakis, D. G. (2006). *Digital Signal Processing: Principles, Algorithms, and Applications* . Prentice Hall.
4.
5.
Lyons, R. G. (2010). *Understanding Digital Signal Processing* . Prentice Hall.
6.

Control Systems Design
1.
Ogata, K. (2010). *Modern Control Engineering* . Prentice Hall.
2.
3.
Franklin, G. F., Powell, J. D., & Emami-Naeini, A. (2015). *Feedback Control of Dynamic Systems* . Pearson.
4.
5.
Dorf, R. C., & Bishop, R. H. (2016). *Modern Control Systems* . Pearson.
6.
Advanced Communication Systems

1.
Proakis, J. G. (2000). *Digital Communications* . McGraw-Hill.
2.
3.
Haykin, S. (2008). *Communication Systems* . Wiley.
4.
5.
Goldsmith, A. (2005). *Wireless Communications* . Cambridge University Press.
6.
Power Systems Engineering
1.
Glover, J. D., Sarma, M. S., & Overbye, T. J. (2016). *Power System Analysis and Design* . Cengage Learning.
2.
3.

Grainger, J. J., & Stevenson Jr, W. D. (1994). *Power System Analysis* . McGraw-Hill.
4.
5.
El-Hawary, M. E. (2008). *Introduction to Electrical Power Systems* . Wiley.
6.
Renewable Energy Systems
1.
Boyle, G. (2004). *Renewable Energy: Power for a Sustainable Future* . Oxford University Press.
2.
3.

Jenkins, D. (2013). *Renewable Energy Systems: The Earthscan Expert Guide to Renewable Energy Technologies for Home and Business* . Routledge.
4.
5.
Masters, G. M. (2013). *Renewable and Efficient Electric Power Systems* . Wiley-IEEE Press.
6.
VLSI (Very Large Scale Integration) Design
1.
Weste, N. H. E., & Harris, D. (2010). *CMOS VLSI Design: A Circuits and Systems Perspective* . Addison-Wesley.
2.
3.

Kang, S. M., & Leblebici, Y. (2003). *CMOS Digital Integrated Circuits: Analysis and Design* . McGraw-Hill.
4.
5.
Wolf, W. (1994). *Modern VLSI Design: System-on-Chip Design* . Pearson.
6.
Machine Learning in Electrical Engineering
1.
Murphy, K. P. (2012). *Machine Learning: A Probabilistic Perspective* . MIT Press.
2.
3.
Bishop, C. M. (2006). *Pattern Recognition and Machine Learning* . Springer.
4.
5.
Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning* . MIT Press.

6.
These references should provide a comprehensive understanding of each course topic. If you have any more specific needs or questions, feel free to ask!