

BACHELOR OF TECHNOLOGY IN INDUSTRIAL ELECTRONIC AUTOMATION WITH HONOURS (BERL)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. To produce industrial electronic automation technologist who can perform automation tasks and solve problems in automation work.
2. To produce technopreneurs in electronic related technology.
3. To produce relevant, respected and referred professionals in industrial electronic automation technology.

BACHELOR OF TECHNOLOGY IN INDUSTRIAL ELECTRONIC AUTOMATION WITH HONOURS (BERL)

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in industrial electronic automation.
PLO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PLO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in industrial electronic automation.
PLO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PLO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PLO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PLO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PLO8	Demonstrate professionalism and social and ethical consideration.
PLO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

Bachelor of Technology in Industrial Electronic Automation with Honours (BERL)

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BERL 1112	Technology Skill and Development in Electronic Automation I <i>Kemahiran Teknologi dan Pembangunan Automasi Elektronik I</i>	P	2	
	BERL 1125	Product Development Technology <i>Teknologi Pembangunan Produk</i>	P	5	
	BERL 1135	Flexible Manufacturing System I <i>Sistem Pembuatan Fleksibel I</i>	P	5	
	BERL 1142	Technology System Programming I <i>Pengaturcaraan Sistem Teknologi I</i>	P	2	
	BIPW 1132	Philosophy and Current Issues <i>Falsafah & Isu Semasa</i>	W	2	
	BTMW 1112	Basic Entrepreneurship <i>Asas Keusahawanan</i>	W	2	
	BLLW 1142	English for Academic Purpose <i>Bahasa Inggeris untuk Tujuan Umum</i>	W	2	
TOTAL CREDITS THIS SEMESTER				20	
SEMESTER 2	BERL 1214	Technology Skill and Development in Electronic Automation II <i>Kemahiran Teknologi dan Pembangunan Automasi Elektronik II</i>	P	4	**BERL 1112
	BERL 1222	Network, Switching and Routing <i>Rangkaian, Pensuisan dan Penghalaan</i>	P	2	
	BERL 1234	Technology System Programming II <i>Pengaturcaraan Sistem Teknologi II</i>	P	4	**BERL 1142
	BERL 1243	Professional Practices <i>Amalan Profesional</i>	P	3	
	BLLW 1XX2	Third Language <i>Bahasa Ketiga</i>	W	2	
	BLLW 2152	Academic Writing <i>Penulisan Akademik</i>	W	2	
TOTAL CREDITS THIS SEMESTER				17	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BERL 2112	Technology Data Acquisition and Analysis I <i>Teknologi Capaian Data dan Analisis I</i>	P	2	
	BERL 2125	Flexible Manufacturing System II <i>Sistem Pembuatan Fleksibel II</i>	P	5	**BERL 1135
	BERL 2135	Embedded System Programming Tool <i>Peralatan Pengaturcaraan Sistem</i>	P	5	
	BERL 2143	Network Security Implementation <i>Implementasi Rangkaian Keselamatan</i>	P	3	
	BIPW 2132	Appreciation of Ethics and Civilisations <i>Penghayatan Etika & Peradaban</i>	W	2	
	BKKX XXX1	Co-Curricular Activity I <i>Ko-kurikulum I</i>	W	1	
TOTAL CREDITS THIS SEMESTER				18	
SEMESTER 4	BERL 2214	Technology Data Acquisition and Analysis II <i>Teknologi Capaian Data dan Analisis II</i>	P	4	**BERL 2112
	BERL 2222	Technology System Optimization I <i>Pengoptimuman Sistem Teknologi I</i>	P	2	
	BERL 2232	Application System Development I <i>Pembangunan Sistem Aplikasi I</i>	P	2	
	BERL 2244	Technology Operation Management <i>Pengurusan Operasi Teknologi</i>	P	4	
	BTMW 2124	Technopreneur Capstone I <i>Capstone Teknousahawan I</i>	P	4	
	BKKX XXX1	Co-Curricular Activity II <i>Ko-kurikulum II</i>	W	1	
TOTAL CREDITS THIS SEMESTER				17	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERL 3114	Technology System Optimization II <i>Pengoptimuman Sistem Teknologi II</i>	P	4	**BERL 2222
	BERL 3124	Application System Development II <i>Pembangunan Sistem Aplikasi II</i>	P	4	**BERL 2232
	BERL 3215	System Integration Designing <i>Rekabentuk Sistem Integrasi</i>	P	5	
	BTMW 3134	Technopreneur Capstone II <i>Capstone Teknousahawan II</i>	P	4	**BTMW 2124
	BLLW 3162	English for Professional Interaction <i>Bahasa Inggeris untuk Interaksi Profesional</i>	W	2	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 6 (WBL)***	BERL 3134	Technology Quality Management <i>Pengurusan Kualiti Teknologi</i>	P	4	
	BERL 3225	Maintenance Management System <i>Sistem Pengurusan Penyelenggaraan</i>	P	5	
	BERP 3234	Final Year Project I <i>Projek Tahun Akhir I</i>	P	4	
TOTAL CREDITS THIS SEMESTER				13	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SHORT SEMESTER (WBL)****	BERP 3316	Final Year Project II <i>Projek Tahun Akhir II</i>	P	6	**BERP 3234
TOTAL CREDITS THIS SEMESTER				6	
SEMESTER 7 (WBL)****	BERP 41112	Industrial Training <i>Latihan Industri</i>	P	12	
TOTAL CREDITS THIS SEMESTER				12	
TOTAL CREDITS				122	

** Pre-requisite subject

**** Courses that will be implemented as Work Based Learning (WBL)

Notes:

Definition of WBL:

'Work-based learning is the term being used to describe a class of university programmes that bring together universities and work organizations to create new learning opportunities in workplaces.'

(Source: Guidelines To Good Practices: Workbased Learning (GGP: WBL),MQA)

Besides the aforementioned curriculum, the Programme offers professional certificate subjects as an added value for the students to increase their employability. Students may choose any ONE (1) subject from the following list.

NO.	CODE	CERTIFICATE NAME
1	BITS 2610	Cisco Certified Network Associate Routing & Switching (Preparation)
2	BEEC 2210	IoT Fundamentals: Connecting Things Professional Certification
3	BEEC 2220	IoT Fundamentals: Big Data & Analytics Professional Certification
4	BEEE 3210	Programmable Logic Controller (PLC) Level 1 and Level 2
5	BEEE 4210	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects

P = program core subjects

University Compulsory	W	16
Programme P	P	94
Industrial Training	P	12
		122

SEMESTER 1

BERL 1112 TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION I KEMAHIRAN TEKNOLOGI DAN PEMBANGUNAN AUTOMASI ELEKTRONIK I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply the basic knowledge and standard practices of electronic circuit design layout using software.
2. Respond a standard practiced of manual technical drawing and able to construct a product using Computer Aided Design (CAD) tool.
3. Communicate technical analysis ideas presented in electronic design.

SYNOPSIS

The aim of this course is to provide students with basic technical skills in electronic automation. This includes basic knowledge of technical drawing, software-based drawing (AutoCAD), Print Circuit Board (PCB) Design.

REFERENCES

1. Autocad 2018 And Autocad Lt 2018 Essentials, John Wiley & Sons Inc, 2018
2. Mastering Autocad And Autocad Lt/ Omura, Benton/ J. Wiley & Sons, 2017.
3. Proteus Design Suite Getting Started Guide, Labcenter Electronics Ltd 1990-2019
4. Bolysted, R., Nashelsky, L., Electronic Devices And Circuit Theory, 11th Edition, Prentice Hall, 2012
5. Floyd, T., Electronic Devices, 9th, Edition Prentice Hall, 2011.

BERL 1125 PRODUCT DEVELOPMENT TECHNOLOGY TEKNOLOGI PEMBANGUNAN PRODUK

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Explain the operational behaviour of circuits components.
2. Demonstrate the ability to construct op-amp based circuits and perform the operation.
3. Verify the working principle of electronic circuits.

SYNOPSIS

This course covers the operational behaviour of circuit components, including resistor, capacitor, inductor, diode, transistor up until integrated circuit (ICs). Important circuits, such as operational amplifier (op-amp) based circuits are also discussed and emphasized. An introduction to digital concept is also covered in this course.

REFERENCES

1. Thomas L. Floyd, Electronic Devices 10th edition, 2018.
2. Robert Boylestad, Electronics Devices and Circuit Theory 11th edition, 2013 by Nathan Clark

BERL 1135 FLEXIBLE MANUFACTURING SYSTEM I SISTEM PEMBUATAN FLEKSIBEL I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Analyse the key concepts of automation technology principle, components, and control system.
2. Construct and integrate automation control system application.
3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will further advancement related to the automation system and integration. the topics will cover an advanced plc programming (FBD, Structured Text, Graph, etc); basic electrical & electronic circuitry; electromechanical; pneumatics and electro-pneumatic systems.

REFERENCES

1. Craig, J.J., Introduction to Robotics Mechanics and Control, 3rd Ed., Addison Wesley Longman, 2017
2. W. Bolton. Programmable Logic Controllers, 6th Edition, Elsevier Newnes, 2015.
3. Terry Bartelt Bird, Industrial Automated Systems, 2011
4. Webb John W., Reis Donald A., Programmable Logic Controllers, New Delhi Pearson & Prentice Hall, 2009
5. Frank Petruzella, Programmable Logic Controllers, Mc Graw Hill, 4th Ed., 2011.

BERL 1142 TECHNOLOGY SYSTEM PROGRAMMING I PENGATURCARAAN SISTEM TEKNOLOGI I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply the fundamental programming concepts in solving problem using programming tools.
2. Produce the algorithm appropriate to given problem.
3. Show the continual desire in developing the algorithm for the given problem.

SYNOPSIS

This course delivers the competency to student in applying the fundamental programming concepts and able to analyse problem and produce the solution using algorithm development tools. Solve the problem using fundamental programming (C or C#). The course will be delivered using the basic programming language that is trending at the current market.

REFERENCES

1. Stuart Reges, Marty Stepp, Allison Obourn, Building Python Programs. Pearson 2019.
2. Miles, Begin to Code with Python, Pearson, 2018

SEMESTER 2

BERL 1214 TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION II KEMAHIRAN TEKNOLOGI DAN PEMBANGUNAN AUTOMASI ELEKTRONIK II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Describe Boolean functions and logic circuit in digital applications.
2. Construct simple logical operations using combinational and sequential logic circuits.
3. Build the digital logic systems.

SYNOPSIS

This course aims to demystify the digital electronics through hands-on work in the lab creating simple machines with embodied behaviours. This course brings students over the beginner's threshold to a basic understanding of the use, terminology, and potential of digital electronic. The skills and concepts taught in this course are presented from an interdisciplinary approach which merges practices in sciences and technology.

REFERENCES

1. Digital Electronics: Principles and Applications Jan 16, 2013 by Roger L Tokheim
2. Digital Electronics: A Practical Approach with VHDL (9th Edition) Jul 28, 2011 by William Kleitz
3. Digital Computer Electronics Jul 1, 2017 by Jerald A Brown Albert P. Malvino

BERL 1222
NETWORK, SWITCHING AND ROUTING
RANGKAIAN, PENSUISAN DAN PENGHALAAN

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply the fundamental concept of networking.
2. Set up the local area network and identify the network IP.
3. Develop a small network.

SYNOPSIS

This course covers networking structure, and functions. The course introduces the principles and structure of IP addressing and the fundamentals of networks, switching and routing.

REFERENCES

1. Introduction to Networks, Mark A. Dye, Allan D. Reid, Cisco Press, 5th Printed October 2015.
2. Network Basics, Antoon (Tony) W. Ruffi, Rick McDonald, Cisco Press, 1st Printed November 2013;
3. Routing and Switching Essentials, Scott Empson, Cheryl Schmidt, Cisco Press, 2nd Printed July 2014.

BERL 1234
TECHNOLOGY SYSTEM PROGRAMMING II
PENGATURCARAAN SISTEM TEKNOLOGI II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Analyse the problem and solve using advance programming in mobile microprocessor.
2. Produce the program appropriate to the solution suggested.
3. Show the continual desire in developing the program in solving the problem.

SYNOPSIS

This course delivers the competency to student in developing programs that can provide programmable solution using advance programming. The course will be delivered using the programming language that is trending at the current market. The student can also develop program to utilize the basic mobile input sensors and respond according to the problems.

REFERENCES

1. Sam Key (2015). Python Programming In A Day & Android Programming In A Day. Sam Key.
2. Stuart Re.g.es, Marty Stepp, Allison Obourn (2019) Building Python Programs. Pearson 2019.
3. Miles, Be.g.in to Code with Python, Pearson, 2018

BERL 1243
PROFESSIONAL PRACTICES
AMALAN PROFESIONAL

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply the issues and challenges of engineering and technology ethics.
2. Analyse hazards, the function of risk management and occupational safety and health (OSHA).
3. Practice the aspects and procedures of le.g.al on engineering and technology issues.

SYNOPSIS

This course aims to explain the main concepts in engineering and technology ethics, risk management and occupational safety and health as well as to expose the students to basic of law in the engineering and technology context.

REFERENCES

1. Van De Poel, I and Royackers, L. (2011) Ethics, Technology, and Engineering: An Introduction, Wiley-Blackwell
2. Winston, M.E., and Edelbach, R.D (2008) Society, Ethics and Technology, Fourth Edition, Cengage Learning
3. Harrington, J.L. (2008) Technology And Society, Jones & Bartlett Learning
4. Lee Mei Peng, Detta, I.J. (2005) General Principles of Malaysian Law, Fifth Edition, Oxford Fajar.
5. Martin, M. And Schinzinger, R. (2004). Ethics in Engineering, mcgraw-Hill.
6. Fleddermann, C.B. (2011) Engineering Ethics, 4th Edition, Prentice Hall
7. Alcorn, P. A. (2001). Practical Ethics for a Technological World. Upper Saddle River, NJ: Prentice Hall.

SEMESTER 3

BERL 2112
TECHNOLOGY DATA ACQUISITION AND ANALYSIS I
TEKNOLOGI CAPAIAN DATA DAN ANALISIS I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Define/apply the electronic sensor.
2. Demonstrate electronic instrumentation comprising of sensor.
3. Apply the working principles of measurement and instrumentation.

SYNOPSIS

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of transducers and sensors. Importance and techniques of signal conditioning is emphasized. Element and principle of data conversion and acquisition and their applications are discussed.

REFERENCES

1. Introduction to Instrumentation and Measurements 3rd Edition, Robert B. Northrop, CRC Press; 3rd edition (March 31, 2017)
2. Smart Sensors for Industrial applications, 1st Edition, Krzysztof Iniewski, CRC Press, Published March 29, 2017.
3. [Http://www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/MoreonTransducersSensorsandActuators.pdf](http://www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/MoreonTransducersSensorsandActuators.pdf)

BERL 2125
FLEXIBLE MANUFACTURING SYSTEM II
SISTEM PEMBUATAN FLEKSIBEL II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Design industrial automation control system using appropriate industrial based approach.
2. Construct hardware system and programming language for specific application in modular production system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will introduce student to the Flexible Manufacturing System which mostly include of machine cell, consisting of a group of processing stations (usually CNC machine tools), interconnected by an automated material handling and storage system, and controlled by an integrated computer system.

REFERENCES

1. Mikell.P.Groover "Automation, Production Systems And Computer Integrated Manufacturing", Prentice Hall, 2016.
2. W. Bolton. Programmable Logic Controllers, 6th Edition, Elsevier Newnes, 2015
3. Sitrain Training For Industry Simatic S7 Totally Integrated Automation (TIA) Portal Service Maintenance 2 (TIA-SERVE2) Training Document, V15.00.00 By Siemens Ag 2018.
4. Festo Didactic Introduction To Industry 4.0 And Its Core Elements Training Document, By Festo Didactic Gmbh 2019.
5. Festo Didactic Applied Plc P1ogramming Or 14.0 Learning System Training Document, By Festo Didactic Gmbh 2019.

BERL 2135

EMBEDDED SYSTEM PROGRAMMING TOOL PERALATAN PENGATURCARAAN SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Describe the theory and basic architecture of microcontroller system.
2. Write program into microcontroller.
3. Interface input and output device to microcontroller.

SYNOPSIS

This course emphasizes the role of microcontroller in an automation system. It covers input and output topics as well as memory usage. In addition, this course will also focus on how to program using language C. Meanwhile, the Raspberry Pi will be used as a controller.

REFERENCES

1. Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall
2. David J. Parrish, "Flexible Manufacturing", Butterworth-Heinemann
3. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall
4. Gideon Halevi and Roland Weill, "Principles of Process Planning - A Logical Approach" Chapman & Hall, London
5. Computer Aided Manufacture by Chien Chang and Richard A Wysk, Prentice HALL

BERL 2143

NETWORK SECURITY IMPLEMENTATION IMPLEMENTASI RANGKAIAN KESELAMATAN

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply network security principles as well as the tools and configurations available.
2. Monitor, detect, investigate, analyse and respond to security incidents.
3. Implement data confidentiality, integrity, availability and security controls on networks, servers and applications.

SYNOPSIS

This course covers foundational understanding of cybersecurity and how it relates to information and network security. It provides core security skills needed for monitoring, detecting, investigating, analysing and responding to security events, thus protecting systems and organizations from cybersecurity risks, threats and vulnerabilities.

REFERENCES

1. Mary Manjikian, "Cybersecurity Ethics: An Introduction", Fouth edition, Routledge, 2017.
2. Edward G. Amoroso, Matthew E. Amoroso, "An Introduction to Cyber Security", Fouth edition, Routledge, 2017.
3. Charles J.Brooks,Christopher Grow, "Cybersecurity Essentials",Fouth edition, Wiley 2017.
4. William M. Hancock, "Cybersecurity Operations Handbook", Second edition, Digital Press, 2016.

SEMESTER 4

BERL 2214

TECHNOLOGY DATA ACQUISITION AND ANALYSIS II TEKNOLOGI CAPAIAN DATA DAN ANALISIS II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. List data transfer techniques.
2. Manipulate wired and wireless communication techniques.
3. Develop mobile applications for monitoring and control.

SYNOPSIS

This course covers data transfer, monitoring and control. This includes data transfer techniques using wired and wireless communication technology. Also introduced is development of mobile applications which allow data monitoring and data storage using mobile devices. In addition, elements of modern control systems are introduced. Control techniques of motors are included.

REFERENCES

1. Pethuru Raj and Anupama C. Raman. The Internet of Things. CRC Press. 2017.
2. Arshdeep Bahga and Vijay Madisetti. Internet of Things: A Hands-on Approach. Universities Press. 2015.
3. Norman Nise, Modern Control Engineering, Wiley 2019

BERL 2222

TECHNOLOGY SYSTEM OPTIMIZATION I PENGOPTIMUMAN SISTEM TEKNOLOGI I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Ability to explain the theory and basic principle of data communication, network and electronic measurement.
2. Apply data communication tools to understands the principles behind theoretical concepts.
3. Apply the working principles of measurement and instrumentation.
4. Design a small network technology including topology maps or network maps.

SYNOPSIS

This course covers the fundamental of data communication network, measurement and instrumentation. This includes the working with current data network, measurement technique and network technology. System application,

configuration and troubleshooting data communication network and electronic measurement is emphasized.

REFERENCES

1. Data and Computer Communications, Tenth Edition, William Stallings, Pearson Education, Inc; (2014)
2. Electronic Test Instruments: Analog and Digital Measurements 2nd Edition, Robert A Witte.
3. Introduction to Instrumentation and Measurements 3rd Edition, Robert B. Northrop, CRC Press; 3 edition (2017)

BERL 2232 APPLICATION SYSTEM DEVELOPMENT I PEMBANGUNAN SISTEM APLIKASI I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply logical database design concept to represent a functioning database.
2. Build a working database using relevant technology according to database standards and procedures.
3. Work independently to solve technical issues arising during database development.

SYNOPSIS

This course provides a foundation in data management concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL), database development using standard Database Management System, and integration of database to application development.

REFERENCES

1. Ramez Elmasri & Shamkant B. Narathe, 'Fundamentals of Database Systems', 7th Ed., Pearson Education, 2016.
2. David McDonald, 'Database Design', Wiley Encyclopedia of Management, 2015.
3. Adrienne Watt, 'Database Design', BCcampus Open Textbook, 2013.
4. Rod Stephens, 'Beginning Database Design Solutions', John Wiley & Sons, 2011.

BERL 2244 TECHNOLOGY OPERATION MANAGEMENT PENGURUSAN OPERASI TEKNOLOGI

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Explain efficiently capacity planning in operation processes of Electronic Industry Automation in order to achieve organization standard, plant location and layout techniques.
2. Design accurately project scheduling and source allocation in project management using Project Evaluation and Review Techniques (PERT), Critical Path Method (CPM) and Linear Programming.
3. Become aware of their own technical passion, desire and capabilities which are crucial for produce quality products.

SYNOPSIS

Technology Operation Management gives knowledge of concepts and principles for production and operations management in Electronic Industry Automation. This course emphasizes production functions, forecasting techniques, efficiency theory, layout techniques, economics order quantity level, control of source acquisition and project scheduling, and production standard must be complied. This course also provides knowledge and skills in planning, decision and control of production in the Electronic Industry Automation.

REFERENCES

1. Alan Muhlemann, John Oakland, Keith Lockyer; Production & Operations Management, Pitman Publishing, London, United Kingdom, 1992 (rep. 1993)
2. James B. Dilworth, Production & Operations Management; Manufacturing & Services; McGraw Hill International Edition, 5th Edition, 1993. ISBN 0-07-016867-X
3. Roger G. Schroeder, Operations Management: Decision Making in the operations function, McGraw Hill international Edition, 1993
4. Williams J. Stevenson, Production/Operations Management, Richard D. Irwin, Inc. Homewood, Illinois, Third Edition, 1990 ISBN 0-256-08029-1/TIE 1097.
5. Fasser, Y., Brettner, D. (2003). Process Improvement in the Electronics Industry, Wiley-Interscience.

BTMW 2124 TECHNOPRENEUR CAPSTONE I CAPSTONE TEKNOUSAHAWAN I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply various financial indicators & tools to prepare for financial information for a new business venture.
2. Acquire skills to analyze financial statements.
3. Display the art of negotiation with investors.

SYNOPSIS

Entrepreneurs need money to start and to grow their business. It is important to understand how revenue is generated, how to source for funds, how to control cash flow, how to assess the success of the company in monetary terms, and how to value a company for various purposes. The course exposes students to the various financial aspects relating to new ventures. These include approaches to secure start-up capital and venture financing. Students learn about the basic accounting, essential financial indicators, the types of funds available, the different categories of investors, the importance of intellectual property in securing finance, the financial details to be included in a business plan required for investment purpose, valuation of company and the art of negotiation with investors.

REFERENCES

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
2. Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
3. McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th edn. Hoboken, NJ: John Wiley & Sons.
4. Stowe, J. D., Robinson, T. R., Pinto, J. E. & McLeavey, D. W. (2007). Equity Asset Valuation. Hoboken, NJ: John Wiley & Sons.
5. Pereiro, L. E. (2002). Valuation of Companies in Emerging Markets. A Practical Approach. New York: John Wiley & Sons.
6. OECD (2015). Boosting Malaysia's National Intellectual Property System for Innovation. Paris: OECD Publishing.

SEMESTER 5

BERL 3114

TECHNOLOGY SYSTEM OPTIMIZATION II
PENGOPTIMUMAN SISTEM TEKNOLOGI II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Define and apply the concepts and features of mobile computing technologies and applications.
2. Demonstrate and develop mobile applications by analyzing their characteristic and requirements.
3. Apply the working principles mobile application, embedded system integration and optimisation.

SYNOPSIS

This course will introduce students to the fundamentals mobile application development, embedded system development and integration optimisation. The student will be introducing to method of development framework of mobile applications that can integrate with embedded system application. Students will also be expected to conduct troubleshooting, testing and optimize the embedded system.

REFERENCES

1. Professional Android 4 Application Development, Reto Meier
2. Embedded Android, Karim Yagmour March 2013
3. App Inventor 2, David Wolber (O'Reilly), 2015
4. Programming Embedded Systems, 2nd Edition by Anthony Massa, Michael Barr
5. Designing Embedded Systems by John Catsoulis (O'Reilly)

BERL 3124
APPLICATION SYSTEM DEVELOPMENT II
PEMBANGUNAN SISTEM APLIKASI II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply system analysis and design techniques to develop a working software application.
2. Build an efficient database based on a well-designed data model using cloud data storage technology.
3. Works independently to solve technical issues arise during application system development.

SYNOPSIS

This course focuses on the analysis and development of systems to meet the increasing need for information within organizations. It presents and analyses various topics such as systems development life cycle, analysis and design techniques, software project planning, requirements collection and structuring, process modelling, data modelling, design of interface and data management, system design and implementation, and testing. It also emphasizes on advanced database design techniques as well as implementation on cloud data storage.

REFERENCES

1. Suad Alagić, 'Software Engineering: Specification, Implementation, Verification', Springer, 2017.
2. Martin Kleppmann, 'Designing Data-Intensive Applications', O'Reilly Media, 2016.
3. Ramez Elmasri & Shamkant B. Narathe, 'Fundamentals of Database Systems', 7th Ed., Pearson Education, 2016.
4. Westley Knight, 'UX for Developers', Apress L. P., 2018.
5. Heinrich Hußmann, 'Model-Driven Development of Advanced User Interfaces', Springer, 2013.

BERL 3215
SYSTEM INTEGRATION DESIGNING
REKABENTUK SISTEM INTEGRASI

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Configure machine and plan-specific HMI tasks using the SCADA software based on the Totally Integrated Automation Portal (TIA Portal).
2. apply and manage the TIA portal and structure of automation system, configuration and parameterization of hardware and PLC programming and SCL Programming.
3. Apply virtual machine and plants concept, IOT, virtual commissioning and integrated energy management.

SYNOPSIS

The aim of this course is to provide students with the technical knowledge and practical experience on Supervisory Control and Data Acquisition (SCADA) in automation technology. SCADA is a system of software and hardware elements that allows industrial organizations to control industrial processes locally or at remote locations as well as monitoring, gathering, and process real-time data.

REFERENCES

1. <http://www.siemens.asia/MY/en/about-us/Business/DF-PD/SITRAIN.aspx>
2. SCADA: Supervisory Control and Data Acquisition, Stuart A. Boyer, International Society of Automation, 2010
3. Industrial Automation with SCADA: Concepts, Communications and Security, K S Manoj, Notion Press, 2019
4. Handbook of SCADA/Control Systems Security, Robert Radvanovsky, Jacob Brodsky, Published 2016 by Routledge

BERL 3144
TECHNOPRENEUR CAPSTONE II
CAPSTONE TEKNOUSAHAWAN II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Make use of the business model canvas incorporating human and financial elements.
2. Write a convincing business plan.
3. Motivate all stakeholders and build a cohesive venture team.

SYNOPSIS

The start-up and growth of an enterprise invariably involves both human and financial capital. To manage the increasing pool of human resources and to convince venture capitalists to invest become two main issues especially for growing venture. This course consists of two parts: in the first part, organization and human resource management are introduced; in the second part, the focus is on writing a convincing business plan to attract venture capital investment. When enterprise starts to take shape and grow, more people will be hired, proper organization, team building, and human resource management will become important issues. In this course, students will be exposed to the various organizational aspects relevant to new ventures and established companies. These include the pros and cons of the different organization structures, conflicts that may arise among employees, and approaches to building strong teams. Human resource management techniques will also be introduced and discussed.

In the second part of the course, the business model canvas will be described listing the connections among the different components of a business. The value of a business plan and the techniques of writing a business plan will be introduced.

REFERENCES

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.

2. Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
3. McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th edn. Hoboken, NJ: John Wiley & Sons.
4. Stowe, J. D., Robinson, T. R., Pinto, J. E. & McLeavey, D. W. (2007). Equity Asset Valuation. Hoboken, NJ: John Wiley & Sons.
5. Pereiro, L. E. (2002). Valuation of Companies in Emerging Markets. A Practical Approach. New York: John Wiley & Sons.
6. OECD (2015). Boosting Malaysia's National Intellectual Property System for Innovation. Paris: OECD Publishing.

SEMESTER 6

BERL 3134 TECHNOLOGY QUALITY MANAGEMENT PENGURUSAN KUALITI TEKNOLOGI

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Analyse quality problems effectively using the principles and tools of total quality management in Electronic Industry Automation.
2. Practice quality control in measures improving products and business performance.
3. Participate actively in quality management project to solve problems in quality management.

SYNOPSIS

This course provides the understanding and knowledge of total quality principles and the use of quality tools to enable students to apply the principles of management, design and production in Electronic Industry Automation. This course covers the introduction to quality and the principles of total quality, its relationship to global competitiveness, ethics and culture in quality management, the 7 quality tools, quality function deployment, continuous improvements, benchmarking, ISO and the implementation aspects of total quality.

REFERENCES

1. Foster, S.Thomos (2010)," Managing Quality" Pearson Education Inc, New Jersey,United States.
2. Tasmin, R. (2013)," Total Quality Management" Penerbit UTHM, Batu Pahat, Malaysia.
3. Ahmad, M.F (2012),"Look East: Total Quality Management Practices Based on Japanese Approach" Penerbit UTHM, Batu Pahat, Malaysia
4. Mauch, P.D. (2010). Quality Management: Theory and Application. Boca Raton, Florida: CRC Press. Call Number: HD62.15 .M38 2010
5. Pekar, J.P. (2009). Business Performance Excellence Through Total Quality Management. 2nd Ed. West Conshohocken, Pennsylvania: ASTM International. Call Number: HD62.15. P44 2009

BERL 3225 MAINTENANCE MANAGEMENT SYSTEM SISTEM PENGURUSAN PENYELENGGARAAN

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Apply of contemporary maintenance management practices.
2. demonstrate competency in manage and developing the maintenance activities in industrial environment.

3. Perform maintenance activities in a cost-effective manner using appropriate software.

SYNOPSIS

This course will introduce student to principle of maintenance management system. The topics to be covered including Introduction to Maintenance Management, Reliability performance of production plants, Total Productive Maintenance (TPM), Maintenance methods and techniques and Maintenance Software Application. Apart of the course implementation, there will be an industrial visit to related industries in order to expose student to the actual practices of maintenance management system.

REFERENCES

1. Allan Wilson Asset Maintenance Management; Industrial Press, 2002
2. Mobley, RK, ed. Maintenance engineering handbook. 8th ed. New York: McGraw-Hill, 2014. ISBN 9780071826617.
3. Total Productive Maintenance, S Borris, McGraw-Hill (2006)
4. Assets maintenance management A guide to developing strategies and improving performance, A Wilson (2007)
5. Reliability-Centred Maintenance, S Moubray, Butterworth and Heinemann (1997)
6. Reliability-Centred Maintenance: Management and Engineering Methods, Anderson, R, T and Neri, L (1990)
7. Introduction to Total Productive Maintenance, S Nakajima, Productivity Press (1988) Press (1988)

BERP 3234 FINAL YEAR PROJECT I PROJEK TAHUN AKHIR I

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Identify issues or problems in industrial technology and propose solutions.
2. Provides proposal for the implementation of Final Year Project.
3. Presents ideas related to research to panel evaluators in more systematic.

SYNOPSIS

This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition, England: Open University Press, 2011.
2. J S Graustein , How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group,2014.
3. David Evans, Paul Gruba, Justin Zobel, How to write better thesis, Springer,2014.
4. Jurnal-jurnal akademik

SHORT SEMESTER

BERP 3316 FINAL YEAR PROJECT II PROJEK TAHUN AKHIR II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Identify issues or problems in industrial technology and propose solutions.
2. Provides proposal for the implementation of Final Year Project.
3. Presents ideas related to research to panel evaluators in more systematic.

SYNOPSIS

This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition, England: Open University Press, 2011.
2. J S Graustein , How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group, 2014.
3. David Evans, Paul Gruba, Justin Zobel, How to write better thesis, Springer, 2014.
4. Jurnal-jurnal akademik

SEMESTER 7

BERP 41112
INDUSTRIAL TRAINING
LATIHAN INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Organizes productive work schedule.
2. Presents communication skills and interact effectively in the organization.
3. Practices self-discipline and responsibility attitude working in a team.

SYNOPSIS

This course is to expose students about the real environment working in engineering field. Understand the work culture in the industry and developing students technical and interpersonal skills as a preparation when serving in an educational institute.

REFERENCES

1. University Industrial Training Guidelines.
2. Faculty Industrial Training Guidelines.
3. University Academic Regulations.