ROADMAP

Latihan Kompetensi Fungsian Skim F (Teknologi Maklumat)

PUSAT PENGETAHUAN KOMUNIKASI & TEKNOLOGI UNIVERSITI SAINS MALAYSIA

RoadMap

ATAU PELAN LATIHAN merupakan salah
satu strategi penting di bawah Pelan Komprehensif
Pembangunan Sumber Manusia PTM yang menggariskan
antara lain halatuju pembangunan kepakaran ICT yang
terancang dan berterusan.

STATISTIK SKIM F

KODGAJI	INDUK	KEJURUTERAAN	KESIHATAN	IPPT	JBTAN LAIN	JUM
FT19	2	0	0	0	1	3
FT22	1	0	2	0	1	4
FT26	1	2	0	0	0	3
FA29	16	9	33	9	29	96
FA32	10	6	19	4	7	46
FA38	1	0	2	0	1	4
F41	6	1	3	2	2	14
F44	31	7	12	1	7	58
F48	5	1	2	1	0	9
F52	3	0	1	0	1	5
F54	1	0	0	0	0	1
JUM	77	26	74	17	49	243

243
Orang Staf

PTM CEMERLANG
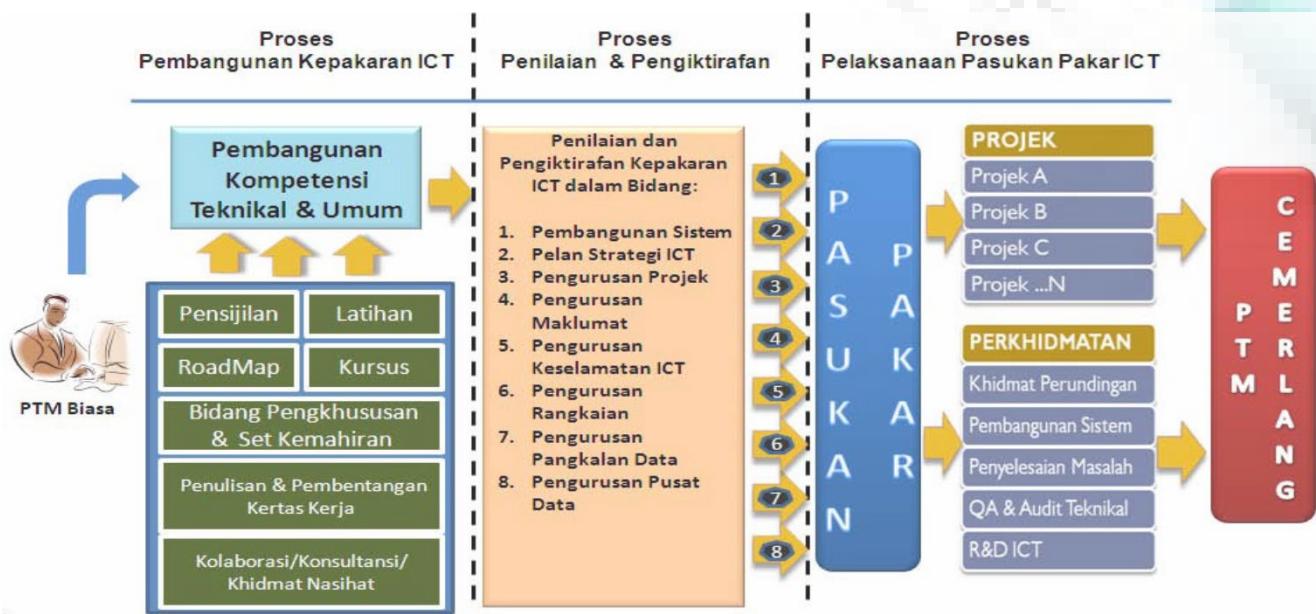
# EMPAT TAHAP KEPAKARAN PTM

Tahap Pakar

Tahap Mahir

Tahap Pengalaman

Tahap Pengetahuan Asas
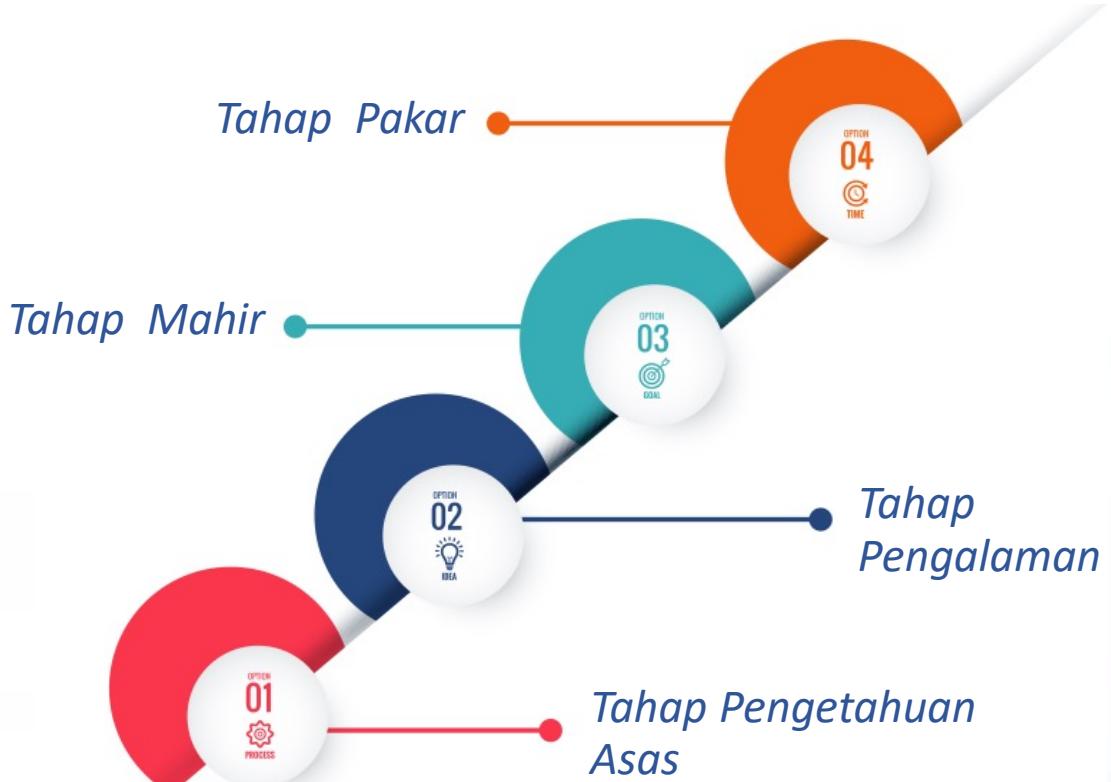
LALUAN PEMBANGUNAN KEPAKARAN ICT
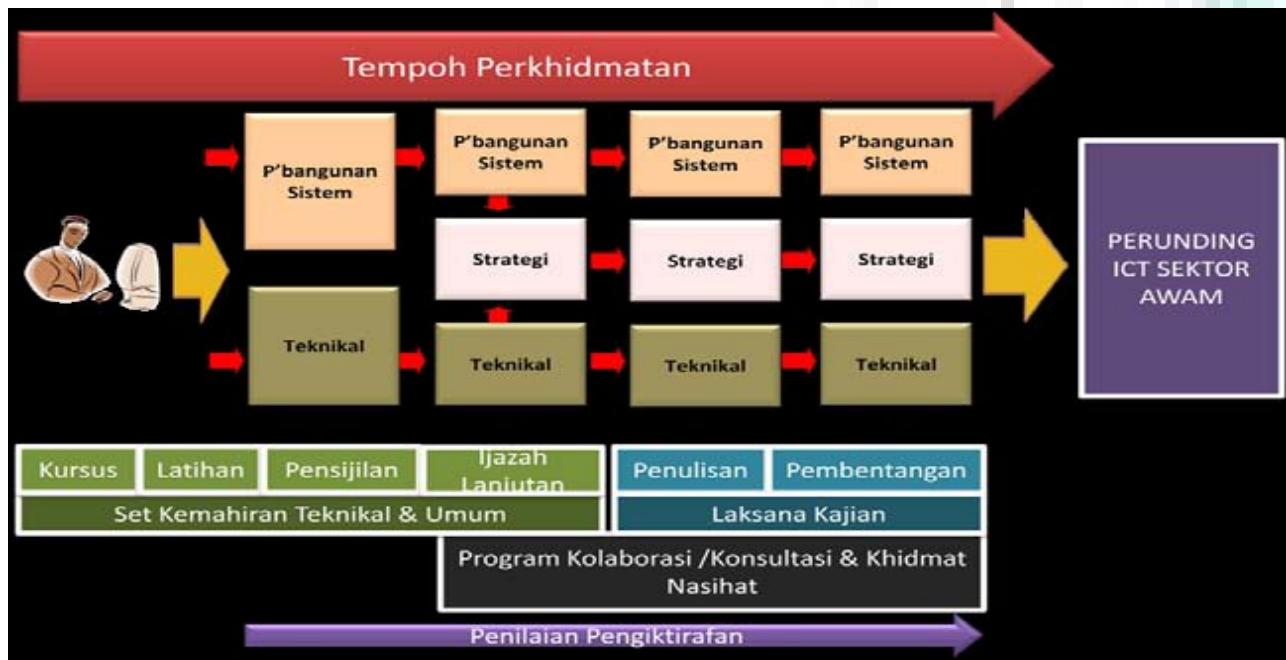
TREK KEPAKARAN, BIDANG PENGKHUSUSAN DAN TAHAP KEPAKARAN ICT

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PELAKSANA (Gred 19,22,29,32,38)

> **PENGETAHUAN / KEMAHIRAN / APLIKASI**
> **Gred FT19 / FT22 / FT26**

- Memahami penyenggaraan kelengkapan ICT/Telekomunikasi
- Mempunyai pengetahuan mengenai perisian, peralatan dan rangkaian & keselamatan ICT
- Memahami & menguasai terminologi ICT/Telekomunikasi/Keselamatan ICT
- Memahami & menguasai penyenggaraan aplikasi
- Memahami konsep pengoperasian sistem
- Mengendalikan komputer
- Mengendalikan peralatan yang berkaitan dengan pemasangan kabel
- Instalasi sistem perisian dan perkakasan
- Memahami spesifikasi

- Kemahiran pencarian maklumat
- Keupayaan mengenalpasti masalah dan menyediakan penyelesaian dengan betul
- Merancang masa
- Kemahiran berkomunikasi
- Berkerja secara berkumpulan

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PELAKSANA (Gred 19,22,29,32,38)

PENGETAHUAN / KEMAHIRAN / APLIKASI
Gred FA29 / FA32

- Mempunyai pengetahuan perkembangan ICT terkini
- Mempunyai pengetahuan di dalam keselamatan ICT
- Menguasai Terminologi ICT dan Multimedia
- Konsep pengaturcaraan
- Mempunyai pengetahuan asas dalam keselamatan aplikasi (pengaturcaraan)
- Memahami & menguasai bahasa pengaturcaraan
- Asas protokol rangkaian
- Asas keselamatan rangkaian
- Perkembangan teknologi dan keselamatan rangkaian
- Konfigurasi rangkaian
- Fungsi perkakasan rangkaian
- Terminologi rangkaian dan keselamatan
- Konsep multimedia
- Perkakasan dan perisian multimedia
- Mengolah data multimedia
- Konsep sistem pengoperasian
- Konsep keselamatan perkakasan
- Memahami spesifikasi

- Kemahiran berkomunikasi
- Merancang masa
- Keupayaan mengenalpasti masalah dan menyediakan penyelesaian dengan betul
- Kreatif
- Kepimpinan
- Berkerja secara berkumpulan

TRAINING ROADMAP F (TEKNOLOGI MAKLUMAT)

Kumpulan PELAKSANA
(Gred 19,22,29,32,38)

> ### *APLIKASI / KEMAHIRAN / SUBJECT MATTER EXPERTS*
> ### *Gred FA36 / FA38*

- Mempunyai pengetahuan perkembangan ICT terkini
- Mempunyai pengetahuan & penguasaan di dalam keselamatan ICT
- Penguasaan konsep pengaturcaraan
- Penguasaan dalam keselamatan aplikasi (pengaturcaraan)
- Menguasai bahasa pengaturcaraan
- Menguasai protokol & konfigurasi rangkaian
- Menguasai keselamatan rangkaian
- Berpengetahuan dala perkembangan teknologi dan keselamatan rangkaian

- Kemahiran berkomunikasi
- Merancang masa
- Keupayaan mengenalpasti masalah dan menyediakan penyelesaian dengan betul
- Kreatif
- Kepimpinan
- Berkerja secara berkumpulan
- Kepimpinan
- Penulisan laporan
- Pengendalian mesyuarat
- Perhubungan awam

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PENGURUSAN & PROFESIONAL
(Gred 41,44,48,52,54)

> ### *PENGETAHUAN / KEMAHIRAN / APLIKASI*
> ### *Gred F41 / F44*

- Pangkalan data
- Sistem pengoperasian
- Sistem rangkaian
- Perkakasan komputer & perisian
- Metodologi pembangunan sistem
- Teknik pengaturcaraan
- Piawaian pengaturcaraan
- Mengikuti perkembangan keselamatan ICT
- Mengurus dan mentadbir sistem keselamatan ICT
- Mengikuti perkembangan teknologi rangkaian
- Memahami konsep asas LAN (Rangkaian Setempat), WAN (Rangkaian Meluas) dan *wireless network*
- Memahami penggunaan alat-alat pengurusan dan pemantauan rangkaian.
- Memahami konsep asas pentadbiran sistem rangkaian
- Mengikuti perkembangan keselamatan ICT
- Mengurus dan mentadbir sistem keselamatan ICT
- Mengikuti perkembangan teknologi rangkaian

- Memahami konsep asas LAN (Rangkaian Setempat), WAN (Rangkaian Meluas) dan *wireless network*
- Memahami penggunaan alat-alat pengurusan dan pemantauan rangkaian
- Memahami konsep asas pentadbiran sistem rangkaian
- *Product packaging*
- Perkembangan ICT terkini
- Pengurusan dan pentadbiran
- Pengurusan kewangan dan bajet
- Nilai dan etika perkhidmatan awam

- Communication Skill
- Report Writing
- Problem Solving
- Pengendalian Perbincangan
- Perhubungan Awam
- Berkerja Secara Berkumpulan
- Negotiation Skill
- Kepimpinan
- Diagnosis And Analytical Skill
- Kreativiti

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PENGURUSAN & PROFESIONAL
(Gred 41,44,48,52,54)

STRATEGIK / SUBJECT MATTER EXPERTS (SME)
Gred F48

- Mempunyai Pengetahuan Perkembangan ICT Terkini.
- Mempunyai Pengetahuan di dalam Pengurusan & Pentadbiran
- Mempunyai Pengetahuan di dalam Pengurusan Kewangan, Aset & Bajet
- Mempunyai Pengetahuan di dalam Pembangunan Sistem & Pengurusan Maklumat
- Mempunyai Pengetahuan & Pengurusan Bidang Teknikal (Rangkaian, Keselamatan ICT, Pusat Data, Komunikasi Bersepadu, Pangkalan Data)
- Mempunyai Pengetahuan di dalam Pengurusan & Perancangan Strategik ICT

- SWOT Analysis
- Stress Management
- Communication Skill
- Report Writing
- Negotiation Skill
- Problem Solving
- Kepimpinan
- Pengendalian Mesyuarat
- Perhubungan Awam
- Pengurusan Projek

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PENGURUSAN & PROFESIONAL
(Gred 41,44,48,52,54)

STRATEGIK / SUBJECT MATTER EXPERTS (SME)
Gred F52

- Mempunyai Pengetahuan Perkembangan ICT Terkini.
- Mempunyai Pengetahuan di dalam Pengurusan & Pentadbiran
- Mempunyai Pengetahuan di dalam Pengurusan Kewangan, Aset & Bajet
- Mempunyai Pengetahuan di dalam Pembangunan Sistem & Pengurusan Maklumat
- Mempunyai Pengetahuan & Pengurusan Bidang Teknikal (Rangkaian, Keselamatan ICT, Pusat Data, Komunikasi Bersepadu, Pangkalan Data)
- Mempunyai Pengetahuan di dalam Pengurusan & Perancangan Strategik ICT
- Mempunyai Pengetahuan di dalam
- pelaksanaan dan penyelenggaraan infrastruktur ICT
- Mempunyai Pengetahuan di dalam
- Perlaksanaan sistem applikasi dan perisian
- Mempunyai Pengetahuan di dalam pematuhan
- kepada keperluan piawaian mutu perkhidmatan ICT dan prosedur pengurusan ICT

- SWOT Analysis
- Stress Management
- Communication Skill
- Report Writing
- Negotiation Skill
- Problem Solving
- Kepimpinan
- Pengendalian Mesyuarat
- Perhubungan Awam
- Pengurusan Projek
- Training Needs Analysis
- Mempunyai pengetahuan di dalam peraturan dan piawaian
- Berpengetahuan dalam pengurusan kualiti (ISO, KMK, TQM, dll)

TRAINING ROADMAP F
(TEKNOLOGI MAKLUMAT)
Kumpulan PENGURUSAN & PROFESIONAL
(Gred 41,44,48,52,54)

STRATEGIK / SUBJECT MATTER EXPERTS (SME)
Gred F54

▪ Berpengetahuan dalam menterjemah visi, misi, objektif dan strategi universiti berkaitan dengan perlaksanaan dan tanggungjawab pengurusan ICT Universiti ▪ Berpengetahuan dalam penyediaan dan penguatkuasaan dasar ICT Universiti ▪ Berpengetahuan dalam pembangunan dan penyelengaraan infrastruktur dan infostruktur ICT ▪ Berpengetahuan dalam merancang pembangunan sumber manusia dalam bidang ICT ▪ Berpengetahuan dalam mewujudkan piawaian dan peraturan berkaitan ICT ▪ Berpengetahuan dalam merancang dan mengurus bajet ▪ Berpengetahuan dalam memastikan mutu perkhidmatan ICT yang berkualiti dan *reliable*	▪ Dicadangkan menghadiri kursus luar yang bersesuaian dengan gred jawatan ▪ *SWOT analysis* ▪ *Stress management* ▪ *Communication skill* ▪ *Report writing* ▪ *Negotiation skill* ▪ *Problem solving* ▪ Kepimpinan ▪ Pengendalian mesyuarat ▪ Perhubungan awam ▪ Pengurusan projek ▪ Training Need Analysis (TNA) ▪ Mempunyai pengetahuan di dalam peraturan dan piawaian ▪ Berpengetahuan dalam pengurusan kualiti (ISO, KMK, TQM, dll) ▪ *Change management* ▪ SLA (Service Level Agreement) ▪ *Risk management*

SKOP LATIHAN

Bil.	Bidang Pengkhususan	Komponen Kemahiran	Contoh Skop Latihan & Kursus (Set Kemahiran)	
1.	Pembangunan Sistem	Business Analysis And Requirement Study	• Business / Analysis • Organization Design & Implementation • Business Process Improvement / Reengineering • Stakeholder Relationship Management	• Supplier Relationship Management • Client Relationship Management • Technology Selection Including OSS • Service Level Management
		Information System Analysis	• System Development Management • Software / Application Development Process Improvement • System Design • Data Analysis	• Network Design • Database Design • Programming / Software Development • System Testing • Service Desk and Incident Management
		System Integration & Human Factors Interaction	• Enterprise Computing • System Integration • Porting / Software Integration • System Installation / Decommissioning • System Ergonomics (Usability)	• Content Creation • Non-Functional Needs Analysis • Usability Evaluation • Human Factors Integration • Website Specialism • Multimedia Specialism
		Software Quality Assurance (SQA)	• Verification & Validation Handling Techniques • Standards & Best Practices • Quality Management • Information System Auditing • Change Management	

Bil.	Bidang Pengkhususan	Komponen Kemahiran	Contoh Skop Latihan & Kursus (Set Kemahiran)	
2.	Perancangan Strategik Sistem Maklumat	Information System Strategic Planning	• Capacity Management • Emerging Technology Monitoring • Financial Management for IT • Enterprise Architecture	• Stakeholder Relationship Management • Strategic Application of Information System IT Governance • Business Analysis and Requirement Study
3.	Pengurusan Maklumat	Information Management	• Data Mining • Content Management • Knowledge Management	• Business Intelligence • Data Warehousing • Information Life Cycle
4.	Pengurusan Projek ICT	i. ICT Project Management	• Capacity Management • Financial Management • Procurement • Programme Management • Project Management • Project Management Office • Risk Management	• Stakeholder Relationship Management • Supplier Relationship Management • Managing Outsourced Project
		ii. Information System Audit	• Quality Management • Quality Assurance • Quality Standards • Compliance Audit	

Bil.	Bidang Pengkhususan	Komponen Kemahiran	Contoh Skop Latihan & Kursus (Set Kemahiran)	
5.	Data Centre Management	Data Centre Development & Management	• Capacity Management • Physical & Environmental Development • Enterprise Resource Management • Information Life Cycle Management • Physical & Environmental Monitoring • Service Management • System Administration • Storage Administration	• Stakeholder Relationship Management • Strategic Application Information System • IT Governance • Business Analysis and Requirement Study • Network Administration • Continuity Management • Operational Risk Management • Compliance Management • Asset Management • Availability Management • Configuration Management • Security Administration • Service Desk & Incident Management
6.	Network Management	i. Network Architecture	• Network Planning • Network Design	
		ii. Network Management & Administration	• Fault Management • Configuration & Performance Management • Utilization Management	• Network Security Management • Network Control and Operation • Compliance Management • Capacity Management
7.	Database Management		• Database Strategy / Planning • Data Mining • Data Warehousing	• Database Administration • Database Architecture & Design • Database Development

Bil.	Bidang Pengkhususan	Komponen Kemahiran	Contoh Skop Latihan & Kursus (Set Kemahiran)	
8.	Information Security Management	i. Information Security Governance, Assessment & Audit	• Legal & Regulatory • Continuity Management • Quality Assurance • Risk Management • Security Strategy	• Security Posture Assessment • Digital Forensic & Investigation • Security Administration • Information Security Incident Management • Security Policy
		ii. Secured System Development Life Cycle	• Information System Acquisition Development & Maintenance • Application Security • Access Control Management • Physical and Environment • Security Management	
		iii. Infrastructure Security	• Authentication & Authorization Management • Physical & Environmental Security • Configuration & Asset Management • Availability Management • Enterprise Computing Security • Operating System Security • Network Security	

PENSIJILAN

BIDANG KEPAKARAN 1 : PENGURUSAN STRATEGIK ICT

B. PENSIJILAN

ASAS

1
- The Open Group Architecture Framework (TOGAF) 9.1 (LEVEL 1)
- Business IT Architecture Fundamental (BITAF)
- Architecting Software With Object Oreiented Analysis and Design (ASOOD)

PERTENGAHAN

- Archimate
- COBIT 5
- Certified IT Architect Architecture Core (CITA-F)
- The Open Group Architecture Framework (TOGAF) 9.1

2

LANJUTAN

3
- Certified IT Architect - Business Technology Strategy (BTS)
- CITA-A - Business Architecture
- CITA-A - Solution Architecture
- Certified IT Architect Professional (CITA-P)
- CITA-A - Software Architecture
- CITA-A - Information Architecture
- CITA-A - Infrastucture Architecture
- Certified IT Architect Specialist (CITA-S)
- The Open Group Certified Architect (Open CA)

BIDANG KEPAKARAN 2 : SAINS DATA

B. PENSIJILAN

ASAS

1
- SAS Certified Data Scientist
- Professional Practical Certificate in Data Engineer
- CCA Spark and Hadoop Developer (Cloudera)

PERTENGAHAN

- SAS Certified Big Data Professional
- Professional Practical Certificate in Data Analyst
- CCA Data Analyst (Cloudera)
- Professional Practical Certificate in Data Engineer
- Professional Practical Certificate in Data Analyst

2

LANJUTAN

3
- SAS Certified Advanced Analytics Professional
- Professional Practical Certificate in Data Scientist
- CCP Data Engineer (Cloudera)

BIDANG KEPAKARAN 3 :
PENGURUSAN PENGETAHUAN DAN MAKLUMAT DIGITAL

B. PENSIJILAN

ASAS

- Certified Knowledge Practitioner (CKP) OLEH KM Institute in Partnership with Sharma Management International, Malaysia

PERTENGAHAN

- Certified Information Professional certification (CIP) oleh Association for Information and Image Management or AIIM
- Certified Data Management Professional (CDMP) certification oleh Management Association International (DAMA) in partnership with Institute for Certification of Computing Professionals (ICCP)

LANJUTAN

- Certified Knowledge Manager (CKM) oleh KM Institute in Partnership with Sharma Management International, Malaysia

BIDANG KEPAKARAN 5 :
PENGURUSAN INSIDEN DAN FORENSIK ICT

24

B. PENSIJILAN

ASAS

- GIAC (SANS Global Information Assurance Certification) Certified Forensics Examiner (GCFE)
- GIAC Information Security Fundamentals (GISF) Fundamental
- Computer Forensic (FCF)

PERTENGAHAN

- GIAC Certified Forensic Analyst (GCFA)
- GIAC Law of Data Security & Investigations (GLEG)
- Certified Ethical Hacker (CEH)

LANJUTAN

- GIAC Reverse Engineering Malware (GREM)
- Computer Hacking Forensic Investigator (CHFI)
- EC-Council Certified Incident Handling (ECIH)

BIDANG KEPAKARAN 4 :
KESELAMATAN DAN PERLINDUNGAN MAKLUMAT

B. PENSIJILAN

ASAS | 1
- Certified Encryption Specialist (ECES), Certified big data security
- Certified Big Data Architect
- GIAC Information Security Fundamentals (GISF)
- System Security Certified Practitioner (SSCP)
- Disaster Recovery Certified Planner (DRCP)
- Disaster Recovery Certified Implementor

PERTENGAHAN
- GIAC Global Industrial Cyber Security Professional (GICSP)
- GIAC Information Security Professional (GISP)
- GIAC Security Essentials Certification (GSEC)
- GIAC Systems and Network Auditor (GSNA)
- Disaster Recovery Certified Manager

2

LANJUTAN

3
- Certified Information Security Manager (CISM)
- Certified Information System Security Professional (CISSP)
- Disaster Recovery Certified Expert Implementor

BIDANG KEPAKARAN 6 :
PENILAIAN TADBIR URUS DAN AUDIT KESELAMATAN MAKLUMAT

B. PENSIJILAN

ASAS | 1
- Information Security Management Systems (ISMS)
- System Security Certified Practioner (SSCP)
- Certified Governance of Enterprise IT (CGEIT)
- Business Continuity Management (BCM) System Implementor

PERTENGAHAN
- GIAC Systems and Network Auditor (GSNA)
- Business System Manager
- Business Continuity Management (BCM) System Manager
- Certified in Risk and Information Control (CRISC)
- Certitification in Risk Management Assurance (CRMA)

2

LANJUTAN

3
- ISO 22301 Business Continuity Management (BCM – Lead Auditor)
- Business Continuity Management (BCM) System Expert Implementor
- BCM System Expert Implementor
- Certified Information Security Manager (CISM)
- Chief Information Security Officer (CISO)

BIDANG KEPAKARAN 7 :
PENGURUSAN PROJEK ICT

B. PENSIJILAN

ASAS

1

- PM Fundamental
- Certified Associate - SAP Activate Project Manager
- CAPM (Certificate Associate in Project Management)

PERTENGAHAN

2

- PMP (Project Management Professional)
- PMI Professional in Business Analysis (PMI-PBA)®
- Portfolio Management Professional (PfMP)
- PMI Risk Management Professional (RMP)
- PMI Agile Certified Practitioner (PMI-ACP)®
- PMI Risk Management Professional (PMI-RMP)
- Accredited PRINCE2

LANJUTAN

3

- PgPMP (Programme Professional Project Management)
- PMP Certification PMBok

BIDANG KEPAKARAN 8 :
PENGURUSAN PUSAT DATA

B. PENSIJILAN

ASAS

1

- Red Hat System Cerified System Administrator (RHCSA)
- Information Storage and Management (EMCISA)
- Certified Data Centre Professional (CDCP®)
- Disaster Recovery Certified Planner (DRCP)
- Disaster Recovery Certified Implementor
- ITIL® Foundation
- Certified Data Centre Facilities Operation Manager (CDCFOM)
- Business Continuity Management (BCM) System Implementor

PERTENGAHAN

2

- Red Hat System Cerified Engineer (RHCE)
- Storage Networking (E20-026)
- Information Availability (E20-017)
- Information Storage Security (E20-021)
- Storage Service Management (E20-022)
- Disaster Recovery Certified Manager
- Certified Data Centre Specialist (CDCS®)
- Disaster Recovery and Virtualization Technology Professional (DR-VT)
- Certified Data Centre Risk Professional (CDRP)
- Business Continuity Management (BCM) System Manager

LANJUTAN

3

- Red Hat System Cerified Architect (RHCA)
- Disaster Recovery Certified Expert Implementor
- Certified Data Centre Expert (CDCE®)
- Certified Data Centre Migration Specialist (CDMS)

BIDANG KEPAKARAN 10 :
PENGURUSAN RANGKAIAN ICT

B. PENSIJILAN

ASAS

- CompTIA A+
- CompTIA IT Fundamentals
- CompTIA Cloud Essentials
- Juniper Networks Design Associate (JNCDA)
- Cisco Certified Entry Networking Technician (CCENT)
- MTA : Networking Fundamentals

PERTENGAHAN

- CompTIA Network +
- CompTIA Linux +
- CompTIA Cloud
- CCNA
- Cisco Certified Design Associate (CCDA)
- Cisco Certified Network Associate (CCNA) Routing and Switching
- CCNA Data Centre
- LPIC-1
- MCSA
- Windows 7 EDA
- CLA
- RHCSA

LANJUTAN

- CCSK
- CNE
- CCDP
- CCNP Data Centre
- CCNP Voice
- CCNP Wireless
- CCP
- CCA
- LPIC-2 Advances
- MCSE
- VCAP-CIA
- RHCE
- CCNP Service Provider

BIDANG KEPAKARAN 14 :
PENGURUSAN PANGKALAN DATA

B. PENSIJILAN

ASAS

- Microsoft Certified Solutions Associate (MCSA)
- Oracle Database 12C Administrator Certified Associate (OCA)
- PostgreSQL Levels (Associate)
- EDB Postgres Advanced Server Levels (Associate)
- MTA : Networking Fundamentals
- MongoDB Certified Developer, Associate Level
- MongoDB Certified DBA Associate Exam
- Cloud Essentials

PERTENGAHAN

- Microsoft Certified Solutions Developer (MCSD)
- Oracle Database 12C Administrator Certified Professional (OCP)
- PostgreSQL Levels (Professional)
- EDB Postgres Advanced Server Levels (Professional)

LANJUTAN

- Microsoft Certified Solutions Expert (MCSE)
- Oracle Certified Expert, Oracle Database 12C : Performance and Tuning

RUJUKAN

- Pra Bengkel Pemantapan Latihan Kompetensi Fungsian 2021, PTI (16 Disember 2020)

- Garis Panduan Kepakaran ICT Sektor Awam Malaysia, Jabatan Perkhidmatan Awam Malaysia

- Laluan Pakar Bidang Khusus (SME) Pegawai Teknologi Maklumat, MAMPU

- [Pekeliling Perkhidmatan Bilangan 7 Tahun 2016, Kemajuan Kerjaya Laluan Pakar Bidang Khusus (Subject Matter Expert - SME) Bagi Pegawai Perkhidmatan Awam Persekutuan