Institute of Information Technology

Proposed Syllabus for
Professional Masters in Information Technologies (PMIT)
Overview of PMIT Program

- Duration of Program: Two Semester
- Duration of each Semester: 6 Months
- Structure of PMIT Program: 04 (Four) Compulsory Courses + 4 (Four) Elective Courses = 08 (Eight) Courses Theoretical courses+ 4 Credit Hours Project
- Total Credit Hours: 08x4+4 = 36 Credit Hours
- Class Time: Friday and/or Saturday
### Semester 1 (Compulsory Courses)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMIT-6101</td>
<td>Advanced Software Engineering</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6102</td>
<td>Advanced Database Systems</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6103</td>
<td>Advanced Networking and Internet Technologies</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6104</td>
<td>Information Systems and Cyber Laws</td>
<td>4.0</td>
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</tbody>
</table>

### Semester 2 (Elective Courses)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit hours</th>
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</thead>
<tbody>
<tr>
<td>PMIT-621××</td>
<td>Elective Course (Group A/B)</td>
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</tr>
<tr>
<td>PMIT-621××</td>
<td>Elective Course (Group A/B)</td>
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</tr>
<tr>
<td>PMIT-621××</td>
<td>Elective Course (Group C)</td>
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<tr>
<td>PMIT-621××</td>
<td>Elective Course (Group D)</td>
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</tr>
<tr>
<td>PMIT-6200</td>
<td>Project (Group E)</td>
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</table>

### List of Elective Courses

#### Group A

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit hours</th>
</tr>
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<tbody>
<tr>
<td>PMIT-6201</td>
<td>Computational Biology</td>
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</tr>
<tr>
<td>PMIT-6202</td>
<td>Advanced Neuroinformatics</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6203</td>
<td>Health Informatics</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6204</td>
<td>Advanced Data Mining for Biological Data</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6205</td>
<td>Neuronal Information Discovery</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6206</td>
<td>Bio-Informatics</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6207</td>
<td>Modeling of Biological Systems</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6208</td>
<td>Advanced Artificial Intelligence and Neural Networks</td>
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#### Group B

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credit hours</th>
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</thead>
<tbody>
<tr>
<td>PMIT-6209</td>
<td>Database Security</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6210</td>
<td>Distributed Computing</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6211</td>
<td>Data Mining &amp; Knowledge Discovery</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6212</td>
<td>Management Information System</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6213</td>
<td>Information System Simulation and Modeling</td>
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</tr>
<tr>
<td>PMIT-6214</td>
<td>Advanced Operating System</td>
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</tr>
<tr>
<td>PMIT-6215</td>
<td>Information Retrieval</td>
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</tr>
<tr>
<td>PMIT-6216</td>
<td>Distributed Databases</td>
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Group C

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credit hours</th>
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</thead>
<tbody>
<tr>
<td>PMIT-6217</td>
<td>Wireless Networks and Mobile Computing</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6218</td>
<td>Multimedia Asset Management System</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6219</td>
<td>Network Security</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6220</td>
<td>Cellular Network Planning</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6221</td>
<td>Fiber Optic Communication</td>
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</tr>
<tr>
<td>PMIT-6222</td>
<td>Advanced Digital Communication</td>
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<tr>
<td>PMIT-6223</td>
<td>Modeling of Data Networks</td>
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<tr>
<td>PMIT-6224</td>
<td>Telecommunication Network Management</td>
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</tr>
<tr>
<td>PMIT-6225</td>
<td>Mobile Application Development</td>
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Group D

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit hours</th>
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<tbody>
<tr>
<td>PMIT-6226</td>
<td>Information System Analysis and Design</td>
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</tr>
<tr>
<td>PMIT-6227</td>
<td>Software Testing and Quality Assessment</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6228</td>
<td>Object Oriented Software Engineering</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6229</td>
<td>Information System Development Ethics</td>
<td>4.0</td>
</tr>
<tr>
<td>PMIT-6230</td>
<td>Advanced Data Structures and Algorithms</td>
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<tr>
<td>PMIT-6231</td>
<td>Advanced Web Technologies</td>
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<tr>
<td>PMIT-6232</td>
<td>Web Securities</td>
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</tr>
<tr>
<td>PMIT-6233</td>
<td>E-commerce</td>
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Group E

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<tr>
<th>Course Code</th>
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<th>Credit hours</th>
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<tbody>
<tr>
<td>PMIT-6200</td>
<td>Project</td>
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Prerequisite Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit hours</th>
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</thead>
<tbody>
<tr>
<td>IT 1101</td>
<td>Information Technology Fundamentals</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 1103</td>
<td>Introduction to Programming Environment</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 1201</td>
<td>Data Structures</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 2205</td>
<td>Data Communication</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 3101</td>
<td>Database Management System</td>
<td>4.0</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>-------------</td>
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</tr>
<tr>
<td>IT 3103</td>
<td>Computer Network and Internet Technology</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 3107</td>
<td>Operating System</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 3109</td>
<td>Simulation and Modeling</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 3201</td>
<td>Software Engineering</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 3205</td>
<td>Web Technologies</td>
<td>4.0</td>
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<tr>
<td>IT 4105</td>
<td>Telecommunication Systems</td>
<td>4.0</td>
</tr>
<tr>
<td>IT 4101</td>
<td>Artificial Intelligences &amp; Neural Networks</td>
<td>4.0</td>
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</tbody>
</table>

**PMIT-6101: Advanced Software Engineering**


**TEXT & REFERENCE BOOKS:**
3. CT Arrington: Enterprise Java with UML, John Wiley.

**PMIT-6102: Advanced Database Systems**


**TEXT & REFERENCE BOOKS:**
2. Distributed Databases, Stefan Seri, Pelagatti Willipse, TMH.
3. Database System Concepts, 5/e, Korth, Silberschatz, Sudershans, TMH

**PMIT-6103: Advanced Networking and Internet Technologies**

**TEXT & REFERENCE BOOKS:**
2. Andrew Tanenbaum, Computer Networks Prentice Hall PTR; 4 edition (August 9, 2002)

**PMIT-6104: Information Systems and Cyber Laws**
TEXT & REFERENCE BOOKS:

PMIT-6201: Computational Biology

TEXT & REFERENCE BOOKS:

PMIT-6202: Advanced Neuroinformatics
CoCoMac and Temporal Lobe, *Data mining: Principles and main techniques*,
*Neuroinformatic databases for brain regions and neuroanatomical connections: BAMS*,
Neuroinformatics systems for literature and experimental data management, Neuroscholar,
*Neural models repositories: Brain Operating Principles Database (BODB), Senselab, Brain imaging databases, Allen Brain Institute Databases, and Nesys, BrainMap and Brede databases.*

**TEXT & REFERENCE BOOKS:**

**PMIT-6203: Health Informatics**


**TEXT & REFERENCE BOOKS:**

**PMIT-6204: Advanced Data Mining for Biological Data**

*Introduction to Data mining: Classification, Clustering, Data Warehousing, Applications of Data Mining, Data Bases: Nucleic Acid Sequences, Genomes, Protein Sequence and Structures, Bibliographic Access to Molecular Biology Data Bases: Entrez, Sequence Retrieval System (SRS), Protein Identification Resource (PIR), Grid-based clustering: A statistical information grid approach, clustering by wavelet analysis, clustering high-dimensional space, Clustering high-dimensional data: subspace clustering, frequent pattern-based clustering, clustering by wavelet analysis, Advanced outlier analysis: Statistical-based
outlier detection, distance-based outlier detection, deviation-based outlier detection, analysis of local outliers, **Collaborative Filtering**: Mining DNA, RNA, and **proteins**: Mining motif patterns, searching homology in large databases, phylogenetic and functional prediction, **Mining gene expression data**: clustering gene expression, e.g., gene regulatory networks, classifying gene expression, e.g., for disease-sensitive gene discovery, Mining mass spectrometry data, Mining and integrating knowledge from biomedical literature, Mining inter-domain associations.

**TEXT & REFERENCE BOOKS:**
1. Biological Data Mining, Stefano Lonardi, Jake Y. Cheng, Chapman & Hall/CRC, 2010

**PMIT-6205: Neuronal Information Discovery**


**TEXT & REFERENCE BOOKS:**

**PMIT-6206: Bio-Informatics**

Introduction to Bioinformatics, Algorithm basics, Overview of Genbank, Introduction to programming with perl, Introduction to statistics using R, Sequence comparison, Pairwise sequence alignment, Pairwise sequence alignment: scoring matrix & local alignment, Sequence database searching, Multiple sequence alignment, Motif & HMM, Phylogeny, Sequencing techniques & genome assembly, Gene finding, Genome comparison & Genome variation, RNA folding & non-coding RNA finding, Protein bioinformatics & structural bioinformatics, Function annotation, Biological pathways & networks, Microarray & clustering algorithm, Mass spectrometry in proteomics, RNA-Seq, R Basics.

**TEXT & REFERENCE BOOKS:**
3. Bio Informatics Methods and Applications, Rastogi, Mendiratta, Rastogi, PHI

PMIT-6207: Modeling of Biological Systems


TEXT & REFERENCE BOOKS:

PMIT-6208: Advanced Artificial Intelligence and Neural Network


TEXT & REFERENCE BOOKS:
1. Intelligence, 3/e, E.Rich, K.Knight, TMH.
3. Artificial Intelligence, A Modern Approach, 2/e, Stuart Russell, Peter Norvig, PHI/PEA.

**PMIT-6209: Database Security**


**TEXT & REFERENCE BOOKS:**


**PMIT-6210: Distributed Computing**


**TEXT & REFERENCE BOOKS:**

1. Java Distributed Computing, Jim Farley, O'Reilly.

**PMIT-6211: Data Mining and Knowledge Discovery**


**TEXT & REFERENCE BOOKS:**
1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, PEA.
2. Introduction to Data Mining with Case Studies, GK Gupta, Prentice Hall.

**PMIT-6212: Management Information Systems**

*Introduction*: Information Systems in Global Business Today, *Global E-Business*: How Businesses Use Information Systems, Ethical and Social Issues in Information Systems, Securing Information Systems, Telecommunications, the Internet and Wireless Technology, *E-Commerce*: Digital Markets, Digital Goods, Building Systems, Enhancing Decision Making, Structure project work through assignment of roles (e.g., project manager, systems analyst, programmer, and software version manager) and use of project work breakdown structure for task management, Manage responsibility on diverse teams through peer review and task accountability arrived at through consensus methods, Assess software, hardware and networking requirements of information system applications accounting for limited funds and/or manpower, Address issues of information system access, training and confidentiality.

**TEXT & REFERENCE BOOKS:**
PMIT-6213: Information System Simulation and Modeling

Emulation Basics: Handling Stepped and Event-based Time in Simulations, Discrete versus Continuous Modelling, Numerical Techniques, Sources and Propagation of Error, Dynamical, Finite State and Complex Model Simulations: Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulation, Converting to Parallel and Distributed Simulations: Partitioning the Data, Partitioning the Algorithms, Handling Inter-partition Dependencies, Probability and Statistics for Simulations and Analysis: Introduction to Queues and Random Noise, Random Variants Generation, Sensitivity Analysis, Simulations Results Analysis and Viewing Tools: Display Forms: Tables, Graphs, and Multidimensional Visualization, Terminals, X and MS Windows, and Web Interfaces, Validation of Model Results.

TEXT & REFERENCE BOOKS:

PMIT-6214 Advanced Operating System


TEXT & REFERENCE BOOKS:
1. Distributed Systems, Principles and Paradigms, 2/e, Tanenbaum, M Van Steen, PHI.
2. Advanced concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, TMH,
2005.
3. Distributed Operating Systems and Algorithm Analysis, Chow, Johnson, PEA.

**PMIT-6215 Information Retrieval**


**TEXT & REFERENCE BOOKS:**

**PMIT-6216: Distributed Databases**


**TEXT & REFERENCE BOOKS:**
1. Distributed Database systems Principles and Systems, Ceri S. Pelagatti. G, MGH.
PMIT-6217: Wireless Networks and Mobile Computing


TEXT & REFERENCE BOOKS:
1. Mobile Communications, 2/e, Jochen Schiller, PEA, 2008.

PMIT-6218: Multimedia Asset Management System


TEXT & REFERENCE BOOKS:
1. Fundamentals of Multimedia, Ze-Nian Li, Mark S. Drew, PHI/PEA.
2. Essentials ActionScript 2.0, Colin Moock, SPD O, REILLY.

PMIT-6219: Network Security

TEXT & REFERENCE BOOKS:
1. Applied Cryptography, 7/e, Bruce SCHNEIER John Wiley & Sons Inc.
2. Cryptography and Network Security, William Stallings, PHI.
3. Introduction to cryptography with coding Theory, 7/e, Wade Trappe, C. Washington, PEA.

PMIT-6220: Cellular Network Planning

TEXT & REFERENCE BOOKS:

PMIT-6221: Fiber Optic Communication


TEXT & REFERENCE BOOKS:

PMIT-6222: Advanced Digital Communication


TEXT & REFERENCE BOOKS:

PMIT-6223: Modeling of Data Networks

TEXT & REFERENCE BOOKS:

PMIT-6224: Telecommunication Network Management
Introduction: Network management standards, network management model, organization model, information model abstract syntax notation 1 (ASN.1), encoding structure, macros, functional model, Network management application functional requirements: Configuration

TEXT & REFERENCE BOOKS:

PMIT-6225: Mobile Application Development
PMIT-6226: Information System Analysis and Design

Introduction: Definition of system, Approaches to system development, System Life Cycle, Installing visible analyst, Project Management, Teaming of groups, CASETOOL: Using VISIBLE ANALYST for Data flow diagram, the survey phase, Information gathering and interviewing, Tools of structured analysis: data flow diagrams (DFD), Events and Data Stores, Entity Relationship Diagram, Data dictionary, Process specification, RMO, evaluating alternatives for requirement, The object-oriented approach to requirements: Class diagram, Use cases and activity diagrams, Structured Design, Transform Analysis, Using visible analyst to create structure chart, Qualities of a good Design: programming simplicity and system morphology, coupling, cohesion.

TEXT & REFERENCE BOOKS:

PMIT-6227: Software Testing and Quality Assessment

TEXT & REFERENCE BOOKS:

**PMIT-6228: Object Oriented Software Engineering**


TEXT & REFERENCE BOOKS:
1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH.

**PMIT-6229: Information System Development Ethics**

TEXT & REFERENCE BOOKS:
3. Information Ethics: Privacy and Intellectual Property By Lee Freeman, A. Graham Peace

PМИT-6230: Advanced Data Structures and Algorithms
C++ Class Overview, Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de-allocation (new and delete), exception handling, Function Overloading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O, Algorithms, performance analysis-time complexity and space complexity, O notation, Omega notation and Theta notation, Review of basic data structures - the list ADT, stack ADT, queue ADT, implementation using template classes in C++, sparse matrix representation, Deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists. Priority Queues, External Sorting, Balanced search trees, Red –Black trees and Splay Trees, B-Tree of order m, Divide and Conquer methods, General method (Greedy), Minimum cost spanning trees, Job sequencing with deadlines, General method (Dynamic Programming), Optimal binary search trees, 0/1 knapsack problem, Ordering Matrix Multiplications

TEXT & REFERENCE BOOKS:

PМИT-6231: Advanced Web Technologies

TEXT & REFERENCE BOOKS:

PMIT-6232: Web securities

TEXT & REFERENCE BOOKS:
1. Principles of Information Security, Michael E. Whitman (Author), Herbert J. Mattor
2. Web Security by Amrit Tiwana, 2nd edition

PMIT-6233: E-Commerce

TEXT & REFERENCE BOOKS:
1. Principles of Internet Marketing by Ward Hanson, SouthWestern Publishing, 2000
2. E-Commerce By J. Botha, revised edition, 2004
3. E-Commerce By Pankaj, 1st edition, 2010