

Modern Information Technology

| Course Title: Modern Information Technology | |
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| Description | This course provides a comprehensive overview of Modern Information Technology and its role in society. Topics include the fundamentals of computer hardware and software, networking and the internet (LAN, WAN, 5G, IoT), cloud computing and virtualization, data management with SQL/NoSQL, and cybersecurity practices. Students will also explore artificial intelligence, blockchain, and quantum computing, along with modern applications such as e-governance, e-commerce, e-learning, and healthcare IT. The course concludes with future trends and ethical considerations, including green IT, privacy, and the digital divide. |
| Semester | Autumn 2025 |
| Neptun code | GEIAL551-Ma |
| Instructor | Dr. Nasraldeen Khleel |
| Credit Hours | 5 |
| Attendance Requirement | Students are required to attend at least 60% of the scheduled classes to be eligible for the course signature |
| Examination | The examination is written, and students will receive some theoretical questions and some practical tasks from the studied material |

Topics and Schedule

| Lecture # | Topic |
|------------------|--|
| Lecture 1 | Introduction to Information Technology (IT) – history and role in society |
| Lecture 2 | Computer Hardware and Software – basics of systems, Operating System (OS), applications |
| Lecture 3 | Networking and Internet – Local Area Network (LAN), Wide Area Network (WAN), protocols, 5G, Internet of Things (IoT) |
| Lecture 4 | Cloud Computing and Virtualization – services, benefits |
| Lecture 5 | Data and Databases – Big data and analytics |
| Lecture 6 | Data and Databases – Structured Query Language (SQL) /NoSQL basics |
| Lecture 7 | Data Visualization for Engineering: Real-time data visualization and customization for reports |
| Lecture 8 | Data Analysis and Manipulation: Introduction to pandas for tabular data. Cleaning and processing experimental or simulation data |
| Lecture 9 | Data Analysis and Manipulation: Descriptive statistics and basic data analysis |
| Lecture 10 | Solving Engineering Problems with Python: Case studies: heat transfer, structural analysis, fluid mechanics, etc. Solving differential equations with SciPy. Engineering optimization problems |
| Lecture 11 | Introduction to SymPy for symbolic mathematics: Simulating simple engineering systems (e.g., pendulum, electrical circuits). Introduction to OpenCV or similar tools for basic image analysis in engineering |
| Lecture 12 | Excel Visual Basic for Applications (VBA) programming |

- [Lecture_notes](#)
- [Exercises and Homeworks](#)
- [Questions of Midterm Exam](#)

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