University of Sana'a
Faculty of Engineering
Department: Electrical
Title of the Program: Computer Engineering and Control

Course Specification of Cloud Technology & IoT

I. Course Identification and General Information:

1.	Course Title:	Cloud Technology & IoT				
2.	Course Code & Number:	CCE324				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	2	-	3
4.	Study level/ semester at which this course is offered:	Fourth Year/ Second Semester				
5.	Pre –requisite (if any):	Computer Programming III (OOP), Microprocessors and Assembly				
6.	Co –requisite (if any):	Embedded Systems & Interfacing				
7.	Program (s) in which the course is offered:	Computer Engineering and Control				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Electrical Engineering Department				
10.	Prepared By:	Assoc. Prof. Dr. Farouk Al-Fuhaidy				
11.	Date of Approval	2020				

II. Course Description:

The cloud computing and Internet of Things (IoT) are presently hot worldwide technologies. Government, marketing, business, academia, healthy, and industry are involved in different aspects of research, implementation, and business with cloud and IoT. This course is intended to develop the student's knowledge and abilities of how cloud computing and IoT can be used as a way to meet application demands in intelligent IoT systems. This course includes, an overview of cloud computing, cloud systems, cloud Services, distributed storage systems, virtualization, and security in the cloud.

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Assoc. Prof. Dr. Farouk Al-Fuhaidy	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

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The course also covers, an understanding and use of the IoT architecture with its entities and protocols, from the IoT devices, via middle layers like edge and fog, up to the cloud. It also includes the understanding of the computing and communication technologies used for IoT, as well as the analysis of their constraints like performance, power efficiency, memory size and communication bandwidth. The laboratory sessions provide hands-on experience of cloud computing and IoT systems and architectures for the development and use of intelligent IoT systems.

III. Course Intended learning outcomes (CILOs) of the course		**Referenced PILOs**
a1	Demonstrate basics knowledge of cloud computing and IoT, Key concepts of virtualization, and Different Cloud Computing services.	A1
a2	Define the technology infrastructure and network requirements for cloud computing and discuss their respective advantages, disadvantages, and application opportunities.	A2
b1	Evaluate and analyze different types of IoT and cloud services and applications with respect to security and privacy issues.	B2
b2	Build a basic IoT system with Cloud computing considering, business, healthy, and industrial environmental issues.	B4
c1	Use real IoT protocols for communication on the appropriate cloud computing solutions and recommendations according to the applications requirements.	C2
c2	Design and program IoT devices, and secure the elements of an IoT device.	C1, C4
d1	Work effectively within groups, pick questions during the lecture and communicate with each other, use IT tools, and visit sites for downloading and reading researches.	D1, D4

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(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1-	Demonstrate basics knowledge of cloud computing and IoT, Key concepts of virtualization, and Different Cloud Computing services.	Active Lectures, Assignments, Laboratory Computer-based Work, Case studies, Individual and Group Works and Discussions, Presentations.	Examinations, homework Presentations, individual and group project reports
a2-	Define the technology infrastructure and network requirements for cloud computing and discuss their respective advantages, disadvantages, and application opportunities.	Active Lectures, Assignments, Laboratory Computer-based Work, Case studies, Individual and Group Works and Discussions, Presentations.	Examinations, homework Presentations, individual and group project reports

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1-	Evaluate and analyze different types of IoT and cloud services and applications with respect to security and privacy issues.	Active Lectures, Assignments, Laboratory Computer-based Work, Case studies, Group Works, and Projects**.**	Examinations, homework, laboratory reports presentations, individual and group project reports
b2-	Build a basic IoT system with Cloud computing considering, business, healthy, and	Active Lectures, Assignments, Laboratory Computer-based Work,	Examinations, homework, laboratory reports presentations, individual and group project reports

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industrial environmental issues.	Case studies, Group Works, and Projects**.**	

© **Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:**		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1- Use real IoT protocols for communication on the appropriate cloud computing solutions and recommendations according to the applications requirements.	Active Lectures, Practical Lab. Experiments, Laboratory Computer-based Work, Case studies, Group Works, and Projects.	Examinations, laboratory reports, presentations, individual and group project reports.
C2- Design and program IoT devices, and secure the elements of an IoT device.	Active Lectures, Practical Lab. Experiments, Laboratory Computer-based Work, Case studies, Group Works, and Projects.	Examinations, laboratory reports, presentations, individual and group project reports.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Work effectively within groups, pick questions during the lecture and communicate with each other, use IT tools, and visit sites for downloading and reading researches.	Active Lectures, Use of IT tools and Web-sites, Case studies, Group Works and Discussions, and Projects.	Presentations, individual and group Project Reports and Presentation.

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IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Course Orientations and overview of Distributed Computing & Trends of Computing	a1	▪ Course Orientations, ▪ Trends of Computing, ▪ Introduction to distributed computing.	1	2
2.	Introduction to Cloud Computing Technology	a1, a2	▪ Introduction to Cloud Computing ▪ Principles of cloud computing, ▪ Properties & Characteristics, ▪ Services and Models, ▪ Deployment Models	1	2
3.	Infrastructure as a Service (IaaS)	a1, a2, b1	▪ Introduction to IaaS, ▪ Resource Virtualization, ▪ Server, ▪ Storage, ▪ Network, ▪ Case studies	1	2
4.	Platform as a Service (PaaS)	a1, a2, b1	▪ Introduction to PaaS, ▪ Cloud platform & Management, ▪ Computation, ▪ Storage,	1	2

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			▪ Case studies		
5.	Software as a Service (SaaS)	a1, a2, b1	▪ Introduction to SaaS, ▪ Web services Web 2.0, ▪ Web OS, ▪ Case studies	1	2
6.	Virtualization & Cloud Issues and Challenges	a1, a2, b1	▪ Virtualization (CPU, Memory, I/O) ▪ Case Study: Amazon EC2 ▪ Cloud provider Lock-in, ▪ Security ▪ Case studies	1	2
7.	Introduction to Hadoop	a1, a2, b1	▪ Typical Hadoop Cluster, ▪ Challenges, ▪ Hadoop Components, ▪ Example	1	2
8.	Hadoop Distributed File System	a1, a2, b1	▪ Big data and hand hop introduction, ▪ Hdfs introduction and Hdfs definition, ▪ Hfds architecture	1	2
9.	Introduction to IoT	a1, a2, b1, b2	▪ Introduction to IoT, Sensing, Actuation, Microcontrollers, ▪ Applications and Services, and ▪ Basics of Networking.	1	2
10.	IoT Communication Protocols	a1, a2, b1, b2, c1	▪ IoT Communication Protocols, ▪ Sensor Networks, and	1	2

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			▪ Machine to machine communications		
11.	IoT Systems	a1, a2, b1, b2, c1, c2	▪ Interoperability in IoT, ▪ Introduction to Arduino ▪ Programming, Integration of Sensors and Actuators with Arduino. ▪ Introduction to Python programming, ▪ Introduction to Raspberry. Implementation of IoT with Raspberry Pi, ▪ Introduction to SDN. SDN for IoT, Data Handling and Analytics, Cloud Computing	2	4
12.	Cloud Computing and IoT	a1, a2, b1, b2, c1, c2	▪ Cloud Computing, Sensor- ▪ Cloud. Fog Computing, ▪ Smart Cities and Smart Homes. ▪ Connected Vehicles, Smart Grid, ▪ Industrial IoT.	1	2
13.	Case Study	a1, a2, b1, b2, c1, d1	▪ Agriculture, Healthcare, Activity Monitoring.	1	2
Number of Weeks /and Units Per Semester				**14**	**28**

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B - Practical Aspect:				
Order	**Tasks/ Experiments**	**Number of Weeks**	**Contact hours**	**Learning Outcomes**
1.	Overview on Computer Software and Applications, Programming Language (Python and/ or Micro-C), Hardware devices and elements (Sensors, Actuators, Microcontrollers), for possibility, Students in groups buy Raspberry Pi and work on during lab. Sessions.	2	4	a1, a2, b1, c2, d1
2.	Cloud Computing & Services Sessions Students works in groups for the development of Simple Learning (optionally any another suggested by the lecturer) Cloud Systems, implementing and verifying IaaS, PaaS, SaaS Services and Security issues, Design and implementation of Software Applications Services, Infrastructure, and Platforms Services.	5	10	a1, a2, b1, b2, c2, d1
3.	Use real IoT Protocols for communications on a cloud computing system	1	2	a1, a2, b1, b2, c1, c2, d1
4.	Design and Implementation of a cloud computing & an IoT System based on Arduino/ Raspberry Pi and Python/ Micro-C Programming Design and implementation of a simple smart healthy room	4	8	a1, a2, b1, b2, c1, c2, d1
5.	Project Presentation	1	2	a1, a2, b1, b2, c1, c2, d1
6.	Final Exam	1	2	a1, a2, b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		**14**	**28**	

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V. Teaching strategies of the course:

- Active Lectures,
- Assignments,
- Laboratory Computer-based Work,
- Practical Lab. Experiments,
- Case studies,
- Group Works and Discussions, and
- Projects.

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Cloud Computing principles, IaaS, PaaS, SaaS, and Security issues	a1, a2, b1, b2, d1	2nd to 7th	6
2.	IoT Principles, Protocols, applications, and programming, and IoT Systems	a1, a2, b1, b2, c1, c2, d1	9th to 13th	5
3.	IoT and Cloud Systems	a1, a2, b1, b2, c1, c2, d1	14th & 15th	4
	Total			**15**

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignments	2nd to 15th	15	10%	a1, a2, b1, b2, c1, c2, d1
2.	Laboratory and Computer-based Works and Reports	3rd to 12th	15	10%	a1, a2, b1, b2, c1, c2, d1
3.	Project Presentation	13th	15	10%	a1, a2, b1, b2, c1, c2, d1
4.	Mid-Term Exam (Theoretical)	8th	15	10%	a1, a2, b1

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5.	Final Exam (Practical)	14th	15	10%	a1, a2, b1, b2, c1, c2, d1
6.	Final Exam (Theoretical)	16th	75	50%	a1, a2, b1, b2, c1, c2, d1
	Total		**150**	**100%**	

VIII. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1- John Rhoton (2009), Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press, ISBN 0956355609, 2009
2- Marlin H. Mickle, 2011, Evolution and Creation of Autonomous, Wireless, Communicating Devices
3- Mahmud, R., Kotagiri, R., & Buyya, R. (2018). Fog computing: A taxonomy, survey and future directions. In Internet of Everything (pp. 103130). Springer, Singapore.
4- Skala, K., Davidovic, D., Afgan, E., Sovic, I., & Sojat, Z. (2015). Scalable distributed computing hierarchy: Cloud, fog and dew computing. Open Journal of Cloud Computing (OJCC), 2(1), 1624.

2- Essential References.

1- Yu, W., Liang, F., He, X., Hatcher, W. G., Lu, C., Lin, J., & Yang, X. (2018). A survey on the edge computing for the In ternet of Things. IEEE Access, 6, 69006919.
2- Serpanos, Dimitrios, and Marilyn Wolf (2017). Internetofthings (IoT) Systems: Architectures, Algorithms, Methodologies. Springer. DOI: https://doi.org/10.1007/978-3-319-69715-4
3- AlFuqaha, A., Guizani, M., Mohammadi, M., Aledhari, M., & Ayyash, M. (2015). Internet of things: A survey on enabling technologies, protocols, and applications. IEEE Communications Surveys & Tutorials, 17(4), 23472376.

3- Electronic Materials and Web Sites *etc*.

1- https://www.internetsociety.org/resources/doc/2015/iot-overview

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	2- Brandon Butler, What is edge computing and how it's changing the network, reprint fro https://www.networkworld.com/article/3224893/internet-of-things/what-is-edge-comput and-how-it-s-changing-the-network.html 3- http://www.njit.edu/education/pdf/academic-integrity-code.pdf 4- The course will be based on lecture content, lectures prepared by lecturer.

IX. Course Policies:

1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.

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7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat** **President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi** **Name of Reviewer from the Department: Asst. Prof. Dr. Adel Ahmed Al-Shakiri**
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa **Assoc. Prof. Dr. Ahmed Mujahed** **Asst. Prof. Dr. Munasar Alsubri**

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University of Sana'a
Faculty of Engineering
Department: Electrical
Title of the Program: Computer Engineering and Control

Template for Course Plan of Cloud Technology & IoT

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Assoc. Prof. Dr. Farouk AL-Fuhaidy	**Office Hours**					
Location& Telephone No.	777909815	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	farouqakh@gmail.com						

II. Course Identification and General Information:						
1.	Course Title:	Cloud Technology & IoT				
2.	Course Number & Code:	CCE324				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	2	-	3
4.	Study level/year at which this course is offered:	Fourth Year / Second Year				
5.	Pre –requisite (if any):	Programming language III (OOP), Microprocessors & Assembly				
6.	Co –requisite (if any):	Embedded Systems & Interfacing				
7.	Program (s) in which the course is offered	Computer Engineering and Control				
8.	Language of teaching the course:	English				
9.	System of Study:	Attend. At least 75%				
10.	Mode of delivery:	Face-to-face supported wit Lab.				
11.	Location of teaching the course:	Electrical Engineering Dept.				

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III. Course Description:

The cloud computing and Internet of Things (IoT) are presently hot worldwide technologies. Government, marketing, business, academia, healthy, and industry are involved in different aspects of research, implementation, and business with cloud and IoT. This course is intended to develop the student's knowledge and abilities of how cloud computing and IoT can be used as a way to meet application demands in intelligent IoT systems. This course includes, an overview of cloud computing, cloud systems, Cloud Services, distributed storage systems, virtualization, and security in the cloud. The course also covers, an understanding and use of the IoT architecture with its entities and protocols, from the IoT devices, via middle layers like edge and fog, up to the cloud. It also includes the understanding of the computing and communication technologies used for IoT, as well as the analysis of their constraints like performance, power efficiency, memory size and communication bandwidth. The laboratory sessions provide hands-on experience of cloud computing and IoT systems and architectures for the development and use of intelligent IoT systems.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop**:**

1. Demonstrate basics knowledge of cloud computing and IoT, Key concepts of virtualization, and Different Cloud Computing services.
2. Define the technology infrastructure and network requirements for cloud computing and discuss their respective advantages, disadvantages, and application opportunities.
3. Evaluate and analyze different types of IoT and cloud services and applications with respect to security and privacy issues.
4. Build a basic IoT system with Cloud computing considering, business, healthy, and industrial environmental issues .
5. Use real IoT protocols for communication on the appropriate cloud computing solutions and recommendations according to the applications requirements.
6. Design and program IoT devices, and secure the elements of an IoT device.

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7.	Work effectively within groups, pick questions during the lecture and communicate with each other, use IT tools, and visit sites for downloading and reading researches.

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Course Orientations and overview of Distributed Computing & Trends of Computing	▪ Course Orientations, ▪ Trends of Computing, ▪ Introduction to distributed computing.	1st	2
2.	Introduction to Cloud Computing Technology	▪ Introduction to Cloud Computing ▪ Principles of cloud computing, ▪ Properties & Characteristics, ▪ Services and Models, ▪ Deployment Models	2nd	2
3.	Infrastructure as a Service (IaaS)	▪ Introduction to IaaS, ▪ Resource Virtualization, ▪ Server, ▪ Storage, ▪ Network, ▪ Case studies	3rd	2
4.	Platform as a Service (PaaS)	▪ Introduction to PaaS, ▪ Cloud platform & Management, ▪ Computation, ▪ Storage, ▪ Case studies	4th	2
5.	Software as a Service (SaaS)	▪ Introduction to SaaS,	5th	2

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		▪ Web services Web 2.0, ▪ Web OS, ▪ Case studies		
6.	Virtualization & Cloud Issues and Challenges	▪ Virtualization (CPU, Memory, I/O) ▪ Case Study: Amazon EC2 ▪ Cloud provider Lock-in, ▪ Security ▪ Case studies	6th	2
7.	Introduction to Hadoop	▪ Typical Hadoop Cluster, ▪ Challenges, ▪ Hadoop Components, ▪ Example	7th	2
8.	Mid-Term Exam	▪ All Prev. Topics	8th	2
9.	Hadoop Distributed File System	▪ Big data and hand hop introduction, ▪ Hdfs introduction and Hdfs definition, ▪ Hfds architecture	9th	2
10.	Introduction to IoT	▪ Introduction to IoT, Sensing, Actuation, Microcontrollers, ▪ Applications and Services, and ▪ Basics of Networking.	10th	2
11.	IoT Communication Protocols	▪ IoT Communication Protocols, ▪ Sensor Networks, and ▪ Machine to machine communications	11th	2
12.	IoT Systems	▪ Interoperability in IoT, ▪ Introduction to Arduino	12th ,13th	4

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		▪ Programming, Integration of Sensors and Actuators with Arduino. ▪ Introduction to Python programming, ▪ Introduction to Raspberry. Implementation of IoT with Raspberry Pi, ▪ Introduction to SDN. SDN for IoT, Data Handling and Analytics, Cloud Computing		
13.	Cloud Computing and IoT	▪ Cloud Computing, Sensor- ▪ Cloud. Fog Computing, ▪ Smart Cities and Smart Homes. ▪ Connected Vehicles, Smart Grid, ▪ Industrial IoT.	14th	2
14.	Case Study	▪ Agriculture, Healthcare, Activity Monitoring.	15th	2
15.	Final Exam	▪ ALL Topics Except No. 14	16th	2
Number of Weeks /and Units Per Semester			**16**	**28**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours
1.	Overview on Computer Software and Applications, Programming Language (Python and/ or Micro-C), Hardware devices and elements (Sensors, Actuators, Microcontrollers), for possibility, Students in groups buy Raspberry Pi and work on during lab. Sessions.	1st ,2nd	4

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2.	Cloud Computing & Services Sessions Students works in groups for the development of Simple Learning (optionally any another suggested by the lecturer) Cloud Systems, implementing and verifying IaaS, PaaS, SaaS Services and Security issues, Design and implementation of Software Applications Services, Infrastructure, and Platforms Services.	3^{rd} ,4^{th} ,5^{th} ,6^{th} ,7^{th}	10
3.	Use real IoT Protocols for communications on a cloud computing system	8^{th}	2
4.	Design and Implementation of a cloud computing & an IoT System based on Arduino/ Raspberry Pi and Python/ Micro-C Programming Design and implementation of a simple smart healthy room	9^{th} ,10^{th} ,11^{th} ,12^{th}	8
5.	Project Presentation	13^{th}	2
6.	Final Exam	14^{th}	2
Number of Weeks /and Units Per Semester		**14**	**28**

VI. Teaching strategies of the course:

- Active Lectures,
- Assignments,
- Laboratory Computer-based Work,
- Practical Lab. Experiments,
- Case studies,
- Group Works and Discussions, and
- Projects.

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VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Cloud Computing principles, IaaS, PaaS, SaaS, and Security issues	a1, a2, b1, b2, d1	2nd to 7th	6
2.	IoT Principles, Protocols, applications, and programming, and IoT Systems	a1, a2, b1, b2, c1, c2, d1	9th to 13th	5
3.	IoT and Cloud Systems	a1, a2, b1, b2, c1, c2, d1	14th & 15th	4
	Total			**15**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignments	2nd to 15th	15	10%	a1, a2, b1, b2, c1, c2, d1
2.	Laboratory and Computer-based Works and Reports	3rd to 12th	15	10%	a1, a2, b1, b2, c1, c2, d1
3.	Project Presentation	13th	15	10%	a1, a2, b1, b2, c1, c2, d1
4.	Mid-Term Exam (Theoretical)	8th	15	10%	a1, a2, b1
5.	Final Exam (Practical)	14th	15	10%	a1, a2, b1, b2, c1, c2, d1
6.	Final Exam (Theoretical)	16th	75	50%	a1, a2, b1, b2, c1, c2, d1
	Total		**150**	**100%**	

IX. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

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1- Required Textbook(s) (maximum two).	
	1. John Rhoton (2009), Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press, ISBN 0956355609, 2009 2. Marlin H. Mickle, 2011, Evolution and Creation of Autonomous, Wireless, Communicating Devices 3. Mahmud, R., Kotagiri, R., & Buyya, R. (2018). Fog computing: A taxonomy, survey and future directions. In Internet of Everything (pp. 103130). Springer, Singapore. 4. Skala, K., Davidovic, D., Afgan, E., Sovic, I., & Sojat, Z. (2015). Scalable distributed computing hierarchy: Cloud, fog and dew computing. Open Journal of Cloud Computing (OJCC), 2(1), 1624.
2- Essential References.	
	1. Yu, W., Liang, F., He, X., Hatcher, W. G., Lu, C., Lin, J., & Yang, X. (2018). A survey on the edge computing for the In ternet of Things. IEEE Access, 6, 69006919. 2. Serpanos, Dimitrios, and Marilyn Wolf (2017). Internetofthings (IoT) Systems: Architectures, Algorithms, Methodologies. Springer. DOI: https://doi.org/10.1007/978-3-319-69715-4 3. AlFuqaha, A., Guizani, M., Mohammadi, M., Aledhari, M., & Ayyash, M. (2015). Internet of things: A survey on enabling technologies, protocols, and applications. IEEE Communications Surveys & Tutorials, 17(4), 23472376.
3- Electronic Materials and Web Sites *etc*.	
	1. https://www.internetsociety.org/resources/doc/2015/iot-overview 2. Brandon Butler, What is edge computing and how it's changing the network, reprint from https://www.networkworld.com/article/3224893/internet-of-things/what-is-edge-computing-and-how-it-s-changing-the-network.html 3. http://www.njit.edu/education/pdf/academic-integrity-code.pdf 4. The course will be based on lecture content, lectures prepared by lecturer.

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X. Course Policies:

1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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