Course Syllabus

1. Brief Information

[Name of the University]	
[Name of the School /College/Faculty offer/own the Course]	
[Computer Science/Computer Engineering/Electrical Engineering/Information Technology/Information Systems/Software Engineering]	
Course Title	Introduction to Emerging Technologies
Course Credits	Credit Hours: 3(2Hr. lecture & 3Hr Lab/Tutorial /Seminar) ECTS: 5
Code	EmTe 1011 or EmTe 1012

Target Students' Major		**Target Year**	1st Year	
Prerequisite(s) for enrollment	**None**	**Capacity (Maximum Number)**		

Instructor		**Office Hour:**	Week, [Start time] – [End time]	
	Mobile	**E-Mail:**		
TA	**Name**	**E-Mail:**		

Course Goal (Learning outcome)	By the end of this course the student will able to: • Identify different emerging technologies • Differentiate different emerging technologies • Select appropriate technology and tools for a given task • Identify necessary inputs for application of emerging technologies		
Course Description	This course will enable students to explore current breakthrough technologies in the areas of Artificial Intelligence, Internet of Things and Augmented Reality that have emerged over the past few years. Besides helping learners become literate in emerging technologies, the course will prepare them to use technology in their respective professional preparations.		
Grade Distribution	Attendance and Class Participation		Students must attend above 80% the lecture classes 100% of Lab/Demonstration.
	Demonstration/Lab work	15%	
	Tests/Quiz	15%	
	Assignment/Presentation	20%	Individual (10)%, Group(10)%
	Exam	50%	
	Neither late assignments nor late projects are allowed		
Teaching Methods	Lecture, Tutorial, Seminar /Demonstration …		

2. Lesson Sequence Plan

Chapter	Title	Detailed Content	Week
1	**Introduction to Emerging Technologies**	➢ Evolution of technologies o Introduction to Industrial revolution o Historical background (IR 1.0, IR 2.0, IR 3.0) o Fourth industrial revolution (IR 4.0) ➢ Role of data for Emerging technologies ➢ Enabling devices and networks for emerging technologies (programmable devices) ➢ Human to Machine Interaction ➢ Future trends in emerging technologies	1-2
2	**Introduction to Data Science**	➢ Overview for Data Science o Definition of data and information o Data types and representation ➢ Data Value Chain o Data Acquisition o Data Analysis o Data Curating o Data Storage o Data Usage ➢ Basic concepts of Big data	3-4
3	**Artificial Intelligence(AI)**	➢ Introduction to AI o What is AI o History of AI o Levels of AI o Types of AI ➢ Applications of AI o Agriculture o Health o Business (Emerging market) o Education ➢ AI tools and platforms (eg: scratch/object tracking) ➢ Sample application with hands on activity (simulation based)	5-7
4	**Internet of Things (IoT)**	➢ Overview of IOT o What is IOT? o History of IOT o Advantages of IOT o Challenges of IOT ➢ How IOT works o Architecture of IOT o Devices and network	8-10

		➢ Applications of IOT o Smart home o Smart grid o Smart city o Wearable devices o Smart farming ➢ IOT tools and platforms (eg: KAA IoT /Device Hive/Zetta/Things Board…) ➢ Sample application with hands on activity (eg IOT based smart farming)	
5	Augmented Reality (AR)	➢ Introduction to AR ➢ Virtual reality (VR) , Augmented Reality(AR) vs mixed reality (MR) ➢ Architecture of AR systems. ➢ Application of AR systems (education, medical, assistance, entertainment) workshop oriented hands demo	11-12
6	Ethics and professionalism of emerging technologies	➢ Technology and ethics ➢ Digital privacy ➢ Accountability and trust ➢ Treats and challenges	13
7	Other emerging technologies	➢ Nanotechnology ➢ Biotechnology ➢ Blockchain technology ➢ Cloud and quantum computing ➢ Autonomic computing ➢ Computer vision ➢ Embed systems ➢ Cyber security ➢ Additive manufacturing (3D Printing) ➢ Etc. …	14-15

3. References

- Follett, J. (2014). Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things: O'Reilly Media.
- Vong, J., & Song, I. (2014). Emerging Technologies for Emerging Markets: Springer Singapore.
- Del Rosal, V. (2015). Disruption: Emerging Technologies and the Future of Work. Emtechub.
- Sadiku, M. N. O. (2019). Emerging Internet-Based Technologies: CRC Press.
- Mohamed Anis Bach Tobji, Rim Jallouli, Yamen Koubaa, Anton Nijholt Digital Economy. Emerging Technologies and

Business Innovation, 2018

- Mahdi H. Miraz, Peter Excell, Andrew Ware, Safeeullah Soomro, Maaruf Ali, Emerging Technologies in Computing, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 200, Springer International Publishing, 2018.
- Francesco Corea. Artificial Intelligence and Exponential Technologies: Business Models Evolution and New Investment Opportunities, 2017.
- Laura Igual and Santi Segui, Introduction to Data Science, A Python Approach to Concepts, Techniques and Applications, Springer International Publishing Switzerland, 2017.
- Laura Igual, Santi Segu, Introduction to Data Science. A Python Approach to Concepts, Techniques and Applications, Undergraduate Topics in Computer Science, Springer, 2017.
- Oleg Chertov, Tymofiy Mylovanov, Yuriy Kondratenko, Janusz Kacprzyk, Vladik Kreinovich, Vadim Stefanuk , Recent Developments in Data Science and Intelligent Analysis of Information, 2019
- Carlos Cordon, Pau Garcia-Milà, Teresa Ferreiro Vilarino, Pablo Caballero, Strategy is Digital: How Companies Can Use Big Data in the Value Chain, 2016
- Wolfgang Ertel, Nathanael T. Black, Introduction to Artificial Intelligence, Springer, 2018
- Stephen Lucci, Danny Kopec, Artificial Intelligence in the 21st Century : A Living Introduction,Mercury Learning & Information, 2015
- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos and David Boyle, From Machine-To-Machine to the Internet of Things. Introduction to a New Age of Intelligence, Academic Press, 2014.
- Gaston C. Hillar, Internet of Things with Python: Interact with the world and rapidly prototype IoT applications using Python, Packt Publishing, 2016.
- Khaled Salah Mohamed, The Era of Internet of Things: Towards a Smart World, Springer, 2019.
- Michael Haller, Mark Billinghurst, Bruce Thomas, Emerging Technologies of Augmented Reality: Interfaces and Design, 2006.
- Bruno Arnaldi, Pascal Guitton, Guillaume Moreau, Virtual Reality and Augmented Reality: Myths and Realities, Wiley-ISTE, 2018.
- Paul Mealy, Virtual & Augmented Reality for Dummies, 2018.
- Timothy Jung, M. Claudia tom Dieck, Augmented Reality and Virtual Reality: Empowering Human, Place and Business, 2019
- Jon Peddie, Augmented Reality : Where We Will All Live, Springer International Publishing, 2017.
- Sandler, Ronald, ed. Ethics and Emerging Technologies. Springer, 2016.
- Sachin Ramar, David Oc'conner, Artificial Intelligence: How it Changes the Future, 2019
- Federica Lucivero, Ethical Assessments of Emerging Technologies: Appraising the moral plausibility of technological

visions, 2016

- Sabine Roeser, Risk, Technology, and Moral Emotions, 2018
- Sven Ove Hansson, The Ethics of Technology: Methods and Approaches, 2017

Notes:

I. National syllabus supported with centrally prepared online material to be hosted on local network.

Development Team

1. Dr. Dereje Engida - AASTU
2. Dr. Dereje Teklu - ASTU
3. Mr. Girma Debele - ASTU

Review Team:

1. Dr. Dereje Hailemariam – AAU
2. Dr. Melkamu Deressa – Assosa University
3. Dr. Teshome Abdo – ASTU
4. Dr. Fitsum Assamnew – AAU
5. Dr. Misrak Girma – AASTU
6. Tamrat Delessa – Haramaya University
7. Samuel Getachew - Haramaya University
8. Tadele Asitatikie – Wollo University
9. Tizazu Bayih – Woldia University
10. Biniam W/Gebrial – Raya University
11. Durasa Deksiso – Arsi University
12. Mekuria Tsegaye – Kebri Dehar University
13. Jibril Yesuf – Dire Dawa University
14. Ayele Ossa – Defence University
15. Kassa Shawel – Mekedela University
16. Natnael Argaw– AAU
17. Tesfaye Abraha – Raya University