UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
META-511	NFTs and the Metaverse	10
Prerequisites	**Department**	**Semester**
None	Digital Innovation	Fall/Spring
Type of Course	**Field**	**Language of Instruction**
Required	Metaverse	English
Level of Course	**Lecturer**	**Year of Study**
2nd Cycle	Dr. George Giaglis	1st
Mode of Delivery	**Work Placement**	**Corequisites**
Face to face	N/A	N/A

Course Objectives:

The main objectives of the course are to:

1. Explain the main types, functionalities and usages of Non-Fungible Tokens (NFTs)
2. Discuss important topics related to NFTs such as PFPs, copyright and provenance
3. Explore financing models in NFTs and the Metaverse and analyse applications of tokenization
4. Equip students with interdisciplinary knowledge on Metaverse and discuss its future trends

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Understand the nature of NFTs, their types, impact and application in Metaverse
2. Design, create, mint, buy, sale or stake their own NFTs and use them in Metaverse applications
3. Explain the contribution of NFTs in art digitization, intellectual property ownership and authenticity
4. Understand and analyse Metaverse future trends

Course Content:

Session 1: Non-Fungible Tokens (NFTs) Fundamentals

- A brief introduction to the Ethereum blockchain and related standards (ERC-20, ERC-721, ERC-1155)
- The structure of ERC-721 and ERC-1155 tokens
- Contract types (standalone, shared)

- Marketplaces
- Financial tools
- Data / Rarity Tools
- Main uses of NFTs to-date:
    - PFPs
    - Generative Art
    - 1 of 1 art, including photography
    - Gaming assets
    - Metaverse assets
    - Access passes / Utility focused
    - Representations of off-chain assets
- Market size and structure

Session 2: Copyright and Provenance in NFTs

- Copyright and Trademarks in traditional art
- "Right Click Save As"
- Copyright vs Provenance in NFTs
- Rights management in NFTs
    - Commercial rights
    - Public domain / permissive licensing models

Session 3: Introduction to Profile Pictures (PFPs)

- What is a PFP?
- PFPs and community building
- PFPs as publicly writeable databases
- PFPs and other forms of decentralized identity
- Future opportunities and challenges in PFPs

Session 4: Art NFTs

- NFTs as a platform and medium for digital art
- CryptoArt
- Cross-over Artists
- Photography
- Future directions Introduction to PFPs

Session 5: Generative Art NFTs

- NFTs, the natural medium for Generative Art?
- The history of Generative Art (1950s to date)
- On-chain Generative Art

- Long-form Generative Art
- Future directions in Generative Art?

Session 6: Key considerations in the NFT space

- Art vs Collectibles: Historical Parallels
- Manufacturing social construction: Aesthetics, rarity, and markets
- NFT-Fi: Financialization of NFTs
- Tax considerations

Session 7: Introduction to Gaming NFTs

- The economics of gaming:
    - In-game economies
    - Economics of game studios
- CryptoKitties and the birth of on-chain gaming
- Play-to-earn gaming
- On-chain gaming vs traditional game economies and economics
- Future of on-chain gaming: opportunities and challenges

Session 8: What is a Metaverse?

- What is the metaverse? Is there one metaverse? Multiple metaverses?
- Early metaverse experiences
- MMORPGs
- VR based systems
- Early NFT-based metaverses
- "Open" NFT-based approaches
- Social networks

Session 9: Trends in Visualization Technology

- State of 3D rendering on desktop/mobile:
    - Proprietary game engines (Unreal Engine and Unity)
    - Web-based standards (WebGl)
    - Pixel streaming
- Extended reality (augmented and virtual reality)
- Current state of technology
- Key opportunities and challenges
- Expected development challenges

Session 10: Financing Models in the NFT and Metaverse Space

- A brief overview of USA securities law:
    - The Howey Test
    - Accredited Investors and Qualified Purchasers

- Investment Companies Act
- Reg A

- Venture Capital
- DAOs
- Token offerings
- Crowdfunding

Session 11: Representing off-chain Objects with NFTs

- Retrospective: Representing off-chain objects on-chain
- Regulatory bridges and enforcement of off-chain claims
- Case Studies:
  - Fashion
  - Real Estate
- Timeline, opportunities, and challenges

Session 12: A Vision for an Open Metaverse: Long-term Technology Stacks for the Digital Society

- History of web 1 and web 2 technology stacks
- Conventional off-chain and permissioned chain technology stacks
  - Social Media
  - Gaming engines
  - CBDC
  - Hardware
- Open on-chain standard stacks
  - Web 3 applications
  - NFTs
  - Open standards

Learning Activities and Teaching Methods:

- Faculty Lectures
- Guest-Lectures Seminars
- Directed and Background Reading
- Case Study Analysis
- Academic Paper Discussion
- Simulations
- Student-led Presentations
- In-Class Exercises

Assessment Methods:

- Interactive activities and classroom participation
- Assignments

- Final exams

Assessment Methods in alignment with Intended Learning Outcomes:

		Intended Learning Outcomes to be assessed			
Assessment Method	**Weighting**	LO1	LO2	LO3	LO4
Interactive activities	15%	✓	✓	✓	✓
Assignments	25%	✓	✓	✓	✓
Exams	60%	✓	✓	✓	✓

Student Study Effort Expected:

Student Study Effort Expected	Hours
Lectures	12h
Assignments	75h
Interactive activities and forum participation	20h
Reading and research	140h
Exam	3h
Total	250h

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
NFT and Metaverse Investing	Matt Hanson	Independently published	2022	979-8416477011

Recommended Textbooks / Readings:

- Bartle, R.A. (2004). Designing virtual worlds. New Riders.
- Boden, M.A. and Edmonds, E.A. (2009). What is generative Art?. Digital Creativity, 20(1-2), pp.21-46.
- Chen, Y. and Bellavitis, C. (2020). Blockchain disruption and decentralized finance: The rise of decentralized business models. Journal of Business Venturing Insights, 13, e00151.
- Christodoulou, K., Katelaris, L., Themistocleous, M., Christodoulou, P. and Iosif, E. (2022). NFTs and the metaverse revolution: research perspectives and open challenges. Blockchains and the Token Economy, pp.139-178.
- Dionisio, J.D.N., Burns, W.G.III and Gilbert, R. (2013). 3D virtual worlds and the metaverse: Current status and future possibilities. ACM Computing Surveys (CSUR), 45(3).
- Duan, H., Chen, L., Jiang, J., Liu, Y., Wang, M. and Chen, X. (2021). Metaverse for social good: A university campus prototype. Proceedings of the 29th ACM International Conference on Multimedia.
- DuPont, Q. (2017). Experiments in algorithmic governance: A history and ethnography of "The DAO," a failed decentralized autonomous organization. In Bitcoin and beyond, pp.157-177.

- Gabriel, R. and Mapes, D. (2019). The Spatial Web: How Web 3.0 will Connect Humans, Machines, and AI to Transform the World. Gabriel Rene.
- Galanter, P. (2003). What is Generative Art? Complexity theory as a context for art theory. In GA2003–6th Generative Art Conference.
- Gupta, A., Jindal, A. and Pandey, P. (2020). Tokenization of Real Estate Using Blockchain Technology. In International Conference on Applied Cryptography and Network Security, Springer.
- Keller, J. and Simon, G. (2002). Toward a peer-to-peer shared virtual reality. In Proceedings 22nd International Conference on Distributed Computing Systems Workshops. IEEE.
- Lacity, M. C. and Treiblmaier, H. (Eds.) (2022). Blockchains and the Token Economy: Theory and Practice. Springer Nature.
- Lee, L. et al. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. arXiv preprint arXiv:2110.05352.
- Leiner, B. M. et al. (1997). The past and future history of the Internet. Communications of the ACM, 40(2), 102-108.
- Nadini, M. et al. (2021). Mapping the NFT revolution: market trends, trade networks, and visual features. Sci Rep 11, 20902. https://doi.org/10.1038/s41598-021-00053-8.
- Stephenson, N. (1992). Snow Crash. ISBN: 978-0553380958.
- Ross, O. and Jensen, J. (2019). Assets under Tokenization: Can Blockchain Technology Improve Post-Trade Processing?.
- Serada, A. et al. (2021). CryptoKitties and the new ludic economy: how blockchain introduces value, ownership, and scarcity in digital gaming. Games and Culture, 16(4), 457-480.
- Themistocleous, M., Christodoulou, K., & Katelaris, L. (2023). An Educational Metaverse Experiment: The first on-chain and in-Metaverse academic course. In Information Systems. EMCIS 2022. Lecture Notes in Business Information Processing, Springer, Cham.
- Trautman, L. J. (2021). Virtual art and non-fungible tokens.
- Valeonti, F. et al. (2021). Crypto collectibles, museum funding and OpenGLAM: challenges, opportunities and the potential of Non-Fungible Tokens (NFTs). Applied Sciences, 11(21), 9931.
- Vidal-Tomás, D. (2022). The new crypto niche: NFTs, play-to-earn, and metaverse tokens. Finance Research Letters, 102742.
- Voshmgir, S. (2020). Token Economy: How the Web3 reinvents the Internet (Vol. 2). Token Kitchen.
- Wang, Q. et al. (2021). Non-fungible token (NFT): Overview, evaluation, opportunities and challenges. arXiv preprint arXiv:2105.07447.
- Zheng, Z. et al. (2017). An overview of blockchain technology: Architecture, consensus, and future trends. In 2017 IEEE international congress on big data (BigData congress). IEEE.